United States
Department of
Agriculture

Natural
Resources
Conservation
Service

In cooperation with United States Department of Agriculture, Forest Service; North Carolina Department of Environment, Health, and Natural Resources; North Carolina Agricultural Research Service; North Carolina Cooperative Extension Service; McDowell Soil and Water Conservation District; and McDowell County Board of Commissioners

Soil Survey of McDowell County, North Carolina

How To Use This Soil Survey

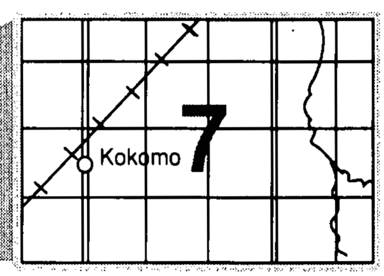
General Soil Map

The general soil map, which is the color map preceding the detailed soil maps, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

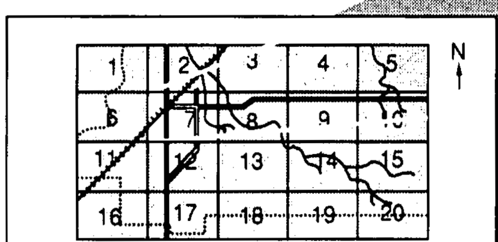
Detailed Soil Maps

The detailed soil maps follow the general soil map. These maps can be useful in planning the use and management of small areas.



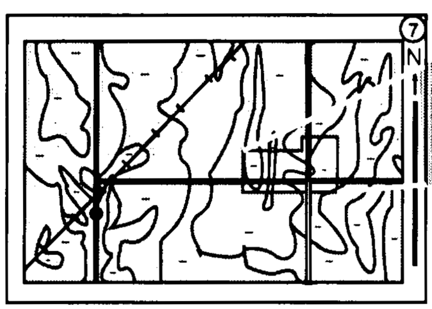
MAP SHEET

To find information about your area of interest, locate that area on the **Index to Map Sheets**, which precedes the soil maps. Note the number of the map sheet, and turn to that sheet.

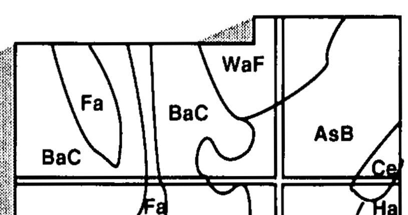


INDEX TO MAP SHEETS

Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Turn to the **Index to Map Units** (see Contents), which lists the map units by symbol and name and shows the page where each map unit is described.



MAP SHEET



AREA OF INTEREST

NOTE: Map unit symbols in a soil survey may consist only of numbers or letters, or they may be a combination of numbers and letters.

The **Summary of Tables** shows which table has data on a specific land use for each detailed soil map unit. See **Contents** for sections of this publication that may address your specific needs.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the North Carolina Agricultural Research Service, and local agencies. The Natural Resources Conservation Service (formerly the Soil Conservation Service) has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1986. Soil names and descriptions were approved in 1989. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1989. This soil survey was made cooperatively by the Natural Resources Conservation Service; the United States Department of Agriculture, Forest Service; the North Carolina Department of Environment, Health, and Natural Resources; the North Carolina Agricultural Research Service; the North Carolina Cooperative Extension Service; the McDowell Soil and Water Conservation District; and the McDowell County Board of Commissioners. It is part of the technical assistance furnished to the McDowell Soil and Water Conservation District. The McDowell County Board of Commissioners provided financial assistance for the survey.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

All programs and services of the Natural Resources Conservation Service are offered on a nondiscriminatory basis, without regard to race, color, national origin, religion, sex, age, marital status, or handicap.

Cover: An area of Ashe and Cleveland soils and Rock outcrop along the Blue Ridge escarpment in McDowell County, North Carolina. This area supports low-grade hardwoods and pine and is used primarily for wildlife habitat.

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Issued September 1995

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Foreword

This soil survey contains information that can be used in land-planning programs in McDowell County. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow over bedrock. Some are unstable and need specially designed foundations for buildings or roads. Wet soils are poorly suited to septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Natural Resources Conservation Service or the North Carolina Cooperative Extension Service.

Richard A. Gallo
State Conservationist
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Soil Survey of
McDowell County, North Carolina

By Roy L. Mathis, Jr., Natural Resources Conservation Service

Soils Surveyed by Roy L. Mathis, Jr., Robert H. Ranson, Jr., and Bruce P. Smith, Jr., Natural Resources Conservation Service, and Stephen Bristow and Robert Raimo, North Carolina Department of Environment, Health, and Natural Resources

United States Department of Agriculture, Natural Resources Conservation Service, in cooperation with
United States Department of Agriculture, Forest Service; North Carolina Department of Environment, Health, and Natural Resources; North Carolina Agricultural Research Service; North Carolina Cooperative Extension Service; McDowell Soil and Water Conservation District; and McDowell County Board of Commissioners

McDowell County is a rural county in the central part of western North Carolina (fig. 1). It has a land area of 279,930 acres, or about 437 square miles. In 1980, it had a population of 35,135. Marion, the county seat and largest town, had a population of about 1,000.

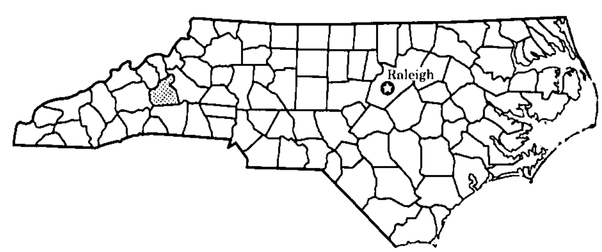

Figure 1.—Location of McDowell County in North Carolina.

General Nature of the County

This section gives general information concerning the county. It describes history and development; physiography, relief, and drainage; water resources; and climate.

History and Development

David Moore, staff archaeologist, North Carolina Department of Cultural Resources, helped prepare this section.

The North Carolina General Assembly established McDowell County in 1842 from parts of Burke and Rutherford Counties. The county was named in honor of Colonel Joseph McDowell, hero in the Battle of Kings Mountain during the Revolutionary War. In 1843, the town of Marion was established to serve as the permanent county seat *(9)*

Native Americans inhabited the area that is now McDowell County more than 10,000 years ago. These early Americans were few in number but had camps throughout the county. By about 1000 A.D., the ancestors of the Cherokee Indians were living in the county in large villages. They grew corn, beans, squash, tobacco, and other crops.

The earliest European settlement occurred in 1566. The Spanish explorer Juan Pardo established a series of small forts during his attempt to secure an overland route to Mexico. One of these forts, Fort San Juan, is believed to have been located in the vicinity of Marion. The fort was occupied by 25 soldiers but was

abandoned within a year because Juan Pardo never got beyond the Appalachian Mountains *(10)*.

The first permanent European settlers were of Scottish and Irish descent. They depended on agriculture and forest products for income. They found very fertile bottom land along the Catawba River and many of the smaller streams in the county. Corn, wheat, rye, oats, and potatoes were some of the leading crops. Hogs, cattle, and chickens were common farm animals. Sawmills became common throughout the county *(9)*.

In the 1800's, placer mining for gold was important near Vein Mountain and Dysartsville. Tons of soil material and gravel were washed through onsite flumes. Promising soil material was also taken by horse and wagon to Vein Mountain Station and shipped by rail to distant locations to separate out the gold. Gold mining waned following the gold rush to California in 1849. By the early 1900's, placer mining for gold was no longer profitable *(18)*.

Manufacturing industries developed along with the railroads in the late 1800's. Textile mills and lumber mills were the first industries.

Although agriculture is important to the current economy of the county, the manufacture of textiles, furniture, and pharmaceuticals accounts for a large part of gross family income. Most agricultural operations are not full-time farms. In 1988, fewer than 25 full-time farmers were in the county. Beef cattle, swine, dairy products, poultry, and horticultural crops account for a large part of gross farm income. Forest products, corn, and orchards make up most of the rest.

Physiography, Relief, and Drainage

Most of McDowell County is in the Blue Ridge Mountain major land resource area. The southeastern part of the county, however, is in the foothill and intermountain area of the Southern Piedmont major land resource area. The topography of the county consists predominantly of strongly sloping to very steep uplands. Narrow, nearly level flood plains are along the smaller streams. Wide, nearly level flood plains and gently sloping to strongly sloping stream terraces are along the Catawba River. Elevation in the county ranges from 980 feet above sea level along Cane Creek on the Rutherford County line to 5,665 feet on Pinnacle Mountain where Buncombe and Yancey Counties join McDowell County.

The northern and western parts of the county are drained by the Catawba River and its tributaries. The south-central part of the county is drained by Cove Creek and by Second Broad River and its tributaries. The southeastern part of the county is drained by Muddy Creek and its tributaries.

Water Resources

Donald R. Link, hydrogeological regional supervisor, North Carolina Department of Environment, Health, and Natural Resources, helped prepare this section.

McDowell County has an abundant supply of water from rivers, streams, lakes, and ground water. Most of the water used for domestic purposes is obtained from wells. Some of this water is obtained from springs, which are common in the mountainous areas of the county. Most of the water used for municipal and industrial purposes is obtained from creeks in the Catawba River watershed and from wells.

Drilled and bored wells are the two types of wells in the county. They yield an average of about 9.4 gallons per minute. They have an average depth of about 222 feet.

Lake James, which is located northeast of Marion on the Catawba River, covers about 3,500 acres.

Climate

Table 1 gives data on temperature and precipitation for the survey area as recorded at Marion, North Carolina, in the period 1951 to 1981. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter, the average temperature is 46 degrees F and the average daily minimum temperature is 29 degrees. The lowest temperature on record, which occurred at Marion on February 18, 1958, is -7 degrees. In summer, the average temperature is 75 degrees and the average daily maximum temperature is 86 degrees. The highest recorded temperature, which occurred at Marion on July 28, 1952, is 106 degrees.

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (50 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is about 56 inches. Of this, 29 inches, or 51 percent, usually falls in April through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 22 inches. The heaviest 1-day rainfall during the period of record was 6.35 inches at Marion on August 3, 1974. Thunderstorms occur on about 46 days each year.

The average seasonal snowfall is about 13 inches. The greatest snow depth at any one time during the period of record was 10 inches. On an average of 1 day

a year, at least 1 inch of snow is on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 90 percent. The sun shines 70 percent of the time possible in summer and 55 percent in winter. The prevailing wind is from the southwest. Average windspeed is highest, 12 miles per hour, in spring.

Every few years in winter, heavy snow covers the ground for a few days to a week. Every few years in late summer or in autumn, a tropical storm moving inland from the Atlantic Ocean causes extremely heavy rains for 1 to 3 days.

How This Survey Was Made

This survey was made to provide information about the soils in McDowell County. The information includes a description of the soils and their location and a discussion of the suitability, limitations, and management of the soils for specified uses. Soil scientists observed the steepness, length, and shape of slopes; the general pattern of drainage; the kinds of crops and native plants growing on the soils; and the kinds of bedrock. They studied many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. It extends from the surface down into the unconsolidated material from which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Soils occur in an orderly pattern that results from the combined influence over time of climate, parent material, relief, and plants and animals. Each kind of soil is associated with a particular kind of landscape or with a segment of the landscape. By observing the soils and relating their position to specific segments of the landscape, soil scientists develop a concept, or model, of how the soils were formed. This model enables the soil scientists to predict with a considerable degree of accuracy the kind of soil at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, depth to bedrock, distribution of plant roots, reaction, and other features that enable them to identify the soils. After describing the soils and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. The system of taxonomic classification used in the United States is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area are generally collected for laboratory analyses and for engineering tests. The data from these analyses and test and from field-observed characteristics and soil properties are used to predict behavior of the soils under different uses. Interpretations are field tested through observation of the soils in different uses under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a relatively high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot assure that a high water table will be at a specific level in the soil on a specific date.

Soil boundaries are drawn on aerial photographs and each delineation is identified as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in accurately locating boundaries.

Map Unit Composition

A map unit delineation on a soil map represents an area dominated by one major kind of soil or an area dominated by two or three kinds of soil. A map unit is identified and named according to the taxonomic

classification of the dominant soil or soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural objects. In common with other natural objects, they have a characteristic variability in their properties. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of soils of other taxonomic classes. Consequently, every map unit is made up of the soil or soils for which it is named and some soils that belong to other taxonomic classes. In the detailed soil map units, these latter soils are called inclusions or included soils. In the general soil map units, they are called minor soils.

Most inclusions have properties and behavioral patterns similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting (similar) inclusions. They may or may not be mentioned in the map unit descriptions. Other inclusions, however, have properties and behavior divergent enough to affect use or require different management. These are contrasting (dissimilar) inclusions. They generally occupy small areas and cannot be shown separately on the soil maps because of the scale used in mapping. The inclusions of contrasting soils are identified in the map unit descriptions. A few inclusions may not have been observed and consequently are not mentioned in the descriptions, especially where the soil pattern was so complex that it was impractical to make enough observations to identify all of the kinds of soils on the landscape.

The presence of inclusions in a map unit in no way diminishes the usefulness or accuracy of the soil data. The objective of soil mapping is not to delineate pure taxonomic classes of soils but rather to separate the landscape into segments that have similar use and management requirements. The delineation of such landscape segments on the map provides sufficient information for the development of resource plans, but onsite investigation is needed to plan for intensive uses in small areas.

General Soil Map Units

The general soil map at the back of this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, it consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one unit can occur in another but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or a building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

1. Evard-Cowee

Moderately steep or steep, well drained soils that have a loamy subsoil; formed in material weathered from gneiss and schist; on uplands in the mountains

The landscape of this map unit is characterized by moderately steep soils on narrow, winding ridgetops separated by steep soils on long mountain side slopes. Slopes range from 10 to 60 percent. Rapidly flowing streams follow winding courses through narrow flood plains in the mountain valleys.

Most of this map unit is used as woodland. Most roads are parallel to the ridgetops or on the contour of side slopes.

This map unit makes up about 21 percent of the county. It is about 59 percent Evard soils, 11 percent Cowee soils, and 30 percent soils of minor extent.

The moderately steep or steep Evard soils are on ridgetops and the smooth parts of side slopes. These soils are very deep. Typically, they have a surface layer of loam.

The steep Cowee soils are on shoulder slopes and nose slopes. These soils are moderately deep over soft bedrock. Typically, they have a surface layer of loam.

The minor soils include Hayesville, Ashe, Chestnut, Edneyville, and Tate soils. Hayesville soils are on strongly sloping ridgetops and have a predominantly clayey subsoil. Ashe, Chestnut, and Edneyville soils are predominantly on side slopes and have less clay in the subsoil than the Evard and Cowee soils. Ashe soils are moderately deep over hard bedrock. Chestnut soils are moderately deep over soft bedrock. Edneyville soils are very deep. Tate soils formed in colluvium and are on foot slopes.

The major soils are suited to trees. Overstory trees include white oak, scarlet oak, yellow-poplar, black locust, chestnut oak, northern red oak, hickory, red maple, Virginia pine, blackgum, and eastern white pine. Understory plants include mountain laurel, blueberry, sourwood, flowering dogwood, Fraser magnolia, Christmas fern, and greenbrier.

The slope is the main limitation affecting woodland management. It increases the hazard of erosion and limits the use of equipment. Extreme caution is needed when vehicles are operated on these soils. In most areas extensive grading is needed to establish roads and trails. Logging roads and skid trails should be laid out on the contour. Water bars break the flow of water along roads. Cable logging reduces the hazard of erosion and eliminates the need for most skid trails and logging roads. In exposed areas applying lime and fertilizer and seeding help to control erosion. The depth to bedrock results in a moderate hazard of windthrow in areas of the Cowee soils. Thinning should be held to a minimum on the Cowee soils, or the stand should not be thinned at all. A plan for the periodic removal of windthrown trees is advisable.

The major soils are poorly suited to most cultivated crops in areas where the slope ranges from 10 to 25 percent and are unsuited in areas where the slope is more than 25 percent. The slope is the main limitation. It increases the hazard of erosion and limits the use of equipment.

The major soils are suited to pasture and hay in areas where the slope is less than 25 percent but are unsuited in areas where the slope is more than 25 percent. The slope is the main limitation. It increases the hazard of erosion and limits the use of equipment.

The major soils are poorly suited to most urban uses

because of the slope and the hazard of erosion. The depth to bedrock also is a limitation in the Cowee soils. Areas used for building site development should be carefully selected. Most of the soils that have a slope of more than 15 percent require substantial cutting and filling and detailed site planning. The Evard soils that have a slope of less than 15 percent are suited to septic tank absorption fields if the fields are properly designed and installed.

2. Hayesville-Evard

Strongly sloping to steep, well drained soils that have a predominantly clayey or loamy subsoil; formed in material weathered from gneiss and schist; on intermountain uplands and foothills

The landscape of this map unit is characterized by strongly sloping soils on narrow ridgetops that are separated by moderately steep or steep soils on short side slopes. Slopes range from 6 to 60 percent. Creeks flow in winding courses through narrow flood plains.

The less sloping parts of this map unit are used for pasture, hay, cultivated crops, or urban uses. The steeper side slopes are generally used as woodland. Most roads are parallel to the ridgetops.

This map unit makes up about 34 percent of the county. It is about 41 percent Hayesville soils, 38 percent Evard soils, and 21 percent soils of minor extent.

The strongly sloping or moderately steep Hayesville soils are on ridgetops and side slopes. These soils are very deep. Typically, they have a surface layer of loam and have a predominantly clayey subsoil. In eroded areas they have a surface layer of clay loam.

The moderately steep or steep Evard soils mostly are on side slopes but also are on some narrow ridgetops. These soils are very deep. Typically, they have a surface layer of loam and have a loamy subsoil.

The minor soils include Iotla, Colvard, Cowee, and Braddock soils. Iotla and Colvard soils formed in recent alluvium and are on narrow flood plains. Cowee soils are on shoulder slopes and nose slopes and are moderately deep over soft bedrock. Braddock soils formed in old alluvium and are on old stream terraces. Also of minor extent are areas of Urban land and Udorthents. Urban land consists of areas covered by asphalt and concrete. Udorthents consist of areas of cut and fill material.

The major soils are suited to trees. Overstory trees include scarlet oak, white oak, Virginia pine, hickory, pitch pine, blackgum, eastern white pine, red maple, black locust, chestnut oak, and yellow-poplar. Understory plants include mountain laurel, blueberry, sourwood, flowering dogwood, Fraser magnolia, Christmas fern, rhododendron, and greenbrier.

In areas of the Hayesville and Evard soils that have a slope of more than 15 percent, the slope increases the hazard of erosion and limits the use of equipment. Logging roads and skid trails should be laid out on the contour. Water bars break the flow of water along roads. In exposed areas applying lime and fertilizer and seeding help to control erosion.

Depth to the clayey part of the subsoil limits the use of equipment in areas of the Hayesville soils. Logging equipment should be operated only during dry periods. The texture of the surface layer also is a limitation in eroded areas of the Hayesville soils. In some areas of the Hayesville soils, the clay loam in the surface layer increases the seedling mortality rate. Reinforcement planting may be necessary.

The Hayesville soils that have a slope of less than 15 percent are suited to most of the field and truck crops commonly grown in the county. The hazard of erosion and the slope are management concerns. If the eroded areas of the Hayesville soils are tilled when too wet, clods form and seed germination may not be uniform across the field. Conservation tillage, contour farming, stripcropping, cover crops, crop residue management, grassed waterways, and field borders improve tilth, conserve moisture, help to control erosion, and reduce offsite damage caused by sedimentation. Areas of the major soils that have a slope of more than 15 percent are unsuited to cultivated crops.

The Hayesville soils are well suited to pasture and hay in areas where the slope is less than 15 percent and are suited in areas where the slope ranges from 15 to 25 percent. Depth to the clayey subsoil in the Hayesville soils and the texture of the surface layer in eroded areas of the Hayesville soils can limit the establishment of sod. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition. The Evard soils that have a slope of more than 25 percent are unsuited to pasture and hay.

The major soils are suited to most urban uses in areas where the slope is less than 15 percent. The slope is a limitation in areas where it ranges from 8 to 15 percent. The high content of clay in the subsoil and the low strength of the subsoil are limitations in areas of the Hayesville soils. The moderate permeability in the clayey part of the subsoil can be overcome by increasing the size of the absorption area in septic tank absorption fields. If the Hayesville soils are used as a base for roads and streets, a mixture of sand and gravel and proper compaction are needed to increase strength and stability. In areas of the major soils, a gravel base and an adequate wearing surface improve trafficability for year-round use.

The major soils are poorly suited to most urban uses in areas where the slope ranges from 15 to 25 percent. Steeper slopes require extensive cutting and filling and detailed site planning. The Evard soils that have a slope of more than 25 percent are unsuited to most urban uses.

3. Chestnut-Ashe-Edneyville

Moderately steep to very steep, well drained or somewhat excessively drained soils that have a loamy subsoil; formed in material weathered from gneiss and schist; on uplands in the mountains

The landscape of this map unit is characterized by moderately steep soils on narrow, winding ridgetops separated by steep or very steep soils on long mountain side slopes. Rock fragments on the surface of these soils range from boulders to cobbles, average about 1 foot in diameter, and are about 25 to 80 feet apart. Slopes range from 10 to 80 percent. Rapidly flowing streams follow winding courses through narrow flood plains in the mountain valleys.

Most of this map unit is used as woodland. Most roads are parallel to the ridgetops or on the contour of side slopes.

This map unit makes up about 25 percent of the county. It is about 38 percent Chestnut soils, 22 percent Ashe soils, 15 percent Edneyville soils, and 25 percent soils of minor extent.

Chestnut soils are on ridgetops and the smooth, lower parts of side slopes. These soils are well drained and are moderately deep over soft bedrock. Typically, they have a surface layer of gravelly sandy loam.

Ashe soils are on very narrow ridgetops, on shoulder slopes, and on bluffs adjacent to streams. These soils are somewhat excessively drained and are moderately deep over hard bedrock. Typically, they have a surface layer of gravelly sandy loam.

Edneyville soils are on ridgetops and the smooth, lower parts of side slopes. These soils are well drained and very deep. Typically, they have a surface layer of gravelly sandy loam.

The minor soils include Porters, Cleveland, Evard, Cowee, Greenlee, Cullasaja, and Tusquitee soils. Porters soils have a surface layer that is darker than that of the major soils and are at elevations above 3,600 feet. The shallow Cleveland soils are on shoulder slopes around bedrock escarpments. The finer textured Evard and Cowee soils are generally at elevations below 3,000 feet. The colluvial Greenlee, Cullasaja, and Tusquitee soils are on foot slopes, benches, and fans. Also of minor extent are areas of rock outcrop on some shoulder slopes.

The major soils are suited to trees. Overstory trees include scarlet oak, chestnut oak, white oak, pitch pine, Table Mountain pine, Virginia pine, eastern white pine, northern red oak, black locust, and black birch. Understory plants include mountain laurel, rhododendron, blueberry, sourwood, Fraser magnolia, flowering dogwood, azalea, greenbrier, wild grape, and galax.

The slope is the main limitation affecting woodland management. It increases the hazard of erosion and limits the use of equipment. Extreme caution is needed when vehicles are operated on these soils. In most areas extensive grading is needed to establish roads and trails. Logging roads and skid trails should be laid out on the contour. Water bars break the flow of water along roads. Cable logging reduces the hazard of erosion and eliminates the need for most skid trails and logging roads. In exposed areas applying lime and fertilizer and seeding help to control erosion.

The depth to bedrock is a limitation in areas of the Chestnut and Ashe soils. It increases the hazard of windthrow. Thinning should be held to a minimum, or the stand should not be thinned at all. A plan for the periodic removal of windthrown trees is advisable. Droughtiness increases the seedling mortality rate in areas of the Ashe soils. Reinforcement planting may be necessary.

The major soils are generally unsuited to cultivated crops, pasture, hay, and most urban uses because of the slope and rock fragments on the surface. The depth to bedrock also is a limitation in the Chestnut and Ashe soils.

4. Iotla-Braddock-Rosman-Potomac

Nearly level to strongly sloping, somewhat poorly drained to somewhat excessively drained soils that have a predominantly loamy, clayey, or sandy subsoil or underlying material; formed in alluvium; on flood plains and stream terraces

The landscape of this map unit is characterized by mountain valleys that have broad, nearly level flood plains and by nearly level to strongly sloping stream terraces along many of the larger streams. Slopes range from 0 to 15 percent. Rapidly flowing streams lose much of their velocity as they flow through areas of this map unit.

Most of this map unit is used as pasture, hayland, cropland, or woodland. Many areas are Urban land.

This map unit makes up about 7 percent of the county. It is about 31 percent Iotla soils, 16 percent Braddock soils, 13 percent Rosman soils, 11 percent Potomac soils, and 29 percent soils of minor extent.

The nearly level Iotla soils are on flood plains. These soils are very deep and somewhat poorly drained.

Typically, they have a surface layer of sandy loam and have predominantly loamy underlying material.

The strongly sloping Braddock soils are on stream terraces. These soils are well drained and very deep. Typically, they have a surface layer of clay loam and have a predominantly clayey subsoil.

The nearly level Rosman soils are on flood plains. These soils are well drained and very deep. Typically, they have a surface layer of loam and have a loamy subsoil.

The nearly level to gently sloping Potomac soils are on flood plains. These soils are somewhat excessively drained and very deep. Typically, they have a surface layer of cobbly loamy sand and have predominantly sandy underlying material. They average more than 35 percent rock fragments throughout.

The minor soils include Dillard, Elsinboro, Colvard, and Biltmore soils and Udifluvents. Dillard soils are moderately well drained and are on low stream terraces. Elsinboro soils are well drained and also are on low stream terraces. Colvard soils are well drained and are on flood plains. Biltmore soils are somewhat excessively drained and also are on flood plains. Udifluvents consist of areas of sandy spoil deposited during sand and gravel mining on flood plains.

Iotla and Rosman soils are well suited to woodland, and Braddock and Potomac soils are suited. Overstory trees include American sycamore, green ash, red maple, yellow-poplar, river birch, scarlet oak, white oak, and Virginia pine. Understory plants include alder, American hornbeam, sourwood, flowering dogwood, American holly, black cherry, greenbrier, honeysuckle, blackberry, giant cane, poison ivy, and wild grape.

No significant limitations affect woodland management in areas of the Iotla and Rosman soils. In areas of the Braddock soils, depth to the clayey part of the subsoil limits the use of equipment and the clay loam in the surface layer increases the seedling mortality rate. The large content of rock fragments in the Potomac soils limits the available water capacity and increases the seedling mortality rate. Reinforcement planting may be needed on the Braddock and Potomac soils. Logging equipment should be operated on all of the soils only during dry periods.

The Rosman soils are well suited to most of the field and truck crops that are commonly grown in the county, and the Iotla and Braddock soils are suited. Wetness is a limitation in areas of the Iotla soils. A surface and subsurface drainage system may be needed to obtain maximum yields. The texture of the topsoil, the hazard of erosion, and the slope are limitations in areas of the Braddock soils. If the Braddock soils are tilled when too wet, clods form and seed germination may not be uniform across the field.

Conservation tillage, contour farming, stripcropping, and grassed waterways may be needed on the Braddock soils. Winter cover crops, crop residue management, and field borders are good management practices in areas of the Iotla, Rosman, and Braddock soils. The Potomac soils are poorly suited to cultivated crops because of droughtiness, rock fragments on and in the soil, and frequent flooding.

The Braddock and Rosman soils are well suited to pasture and hay, and the Iotla soils are suited. Wetness is a limitation in areas of the Iotla soils. A surface and subsurface drainage system may be needed to improve productivity. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods are good management practices in areas of the Iotla, Braddock, and Rosman soils. The Potomac soils are poorly suited to pasture and hay because of droughtiness and rock fragments on and in the soil.

The Iotla, Rosman, and Potomac soils are poorly suited to most urban uses because of flooding. Wetness is a limitation in areas of the Iotla soils. The rock fragments in the Potomac soils are a limitation.

The Braddock soils are suited to most urban uses. The slope, the high content of clay, the moderate permeability, the moderate shrink-swell potential, and the low strength in the subsoil are the main limitations. The moderate permeability in the subsoil can be overcome by increasing the size of the absorption area in septic tank absorption fields. Structural or road damage can be prevented by designing roads, foundations, and footings so that they can withstand the shrinking and swelling of the subsoil, by diverting runoff away from buildings, and by backfilling with material that has a low shrink-swell potential.

If the Braddock soils are used as a base for roads and streets, a mixture of sand and gravel and proper compaction are needed to increase strength and stability. A gravel base and an adequate wearing surface improve trafficability for year-round use.

5. Tate-Greenlee

Strongly sloping or moderately steep, well drained soils that have a predominantly loamy subsoil; formed in colluvium weathered from gneiss and schist; on foot slopes, benches, and fans in the mountains

The landscape of this map unit is characterized by soils at the base of mountains and along drainageways that are notched into side slopes. The Tate soils have very few rock fragments on the surface. Rock fragments on the surface of the Greenlee soils range from boulders to cobbles, average about 30 inches in diameter, and are about 5 to 20 feet apart. Slopes range from 6 to 25 percent. Rapidly flowing streams

follow winding courses out of the mountains.

Most of this map unit is used as woodland. A few areas are used as pasture or homesites. Most roads are on the contour of the slopes at the base of the mountains.

This map unit makes up about 4 percent of the county. It is about 40 percent Tate soils, 25 percent Greenlee soils, and 35 percent soils of minor extent.

Tate soils are very deep. Typically, these soils have a surface layer of loam.

Greenlee soils are very deep. Typically, these soils have a surface layer of very cobbly loam. They average more than 35 percent rock fragments throughout.

The minor soils include Potomac, Iotla, Maymead, Cullasaja, and Tusquitee soils. Potomac and Iotla soils formed in alluvium and are on narrow flood plains. Potomac soils have more than 35 percent rock fragments throughout. Iotla soils are somewhat poorly drained. Maymead, Cullasaja, and Tusquitee soils are in the same landscape positions as the Tate and Greenlee soils. Maymead soils have a subsoil that is coarser textured than that of the Tate soils and have fewer rock fragments than the Greenlee soils. Cullasaja and Tusquitee soils have a dark surface layer that is more than 7 inches thick.

The major soils generally are suited to woodland. The Tate soils that have a slope of less than 15 percent, however, are well suited. Overstory trees include yellow-poplar, eastern hemlock, white oak, sweet birch, northern red oak, red maple, black locust, scarlet oak, eastern white pine, and Virginia pine. Understory plants include rhododendron, mountain laurel, Fraser magnolia, dog hobble, New York fern, Christmas fern, galax, white snakeroot, greenbrier, honeysuckle, blackberry, poison ivy, sourwood, American holly, flowering dogwood, and wild grape.

The slope is a limitation affecting woodland management. It increases the hazard of erosion and limits the use of equipment. Logging roads and skid trails should be laid out on the contour. Water bars break the flow of water along roads. In exposed areas applying lime and fertilizer and seeding help to control erosion. Rock fragments on and below the surface limit woodland management in areas of the Greenlee soils. They reduce the amount of moisture available to plants, increase the seedling mortality rate, and limit the use of equipment. Wheeled tractors and vehicles that have high ground clearance can be operated only over carefully chosen routes in areas of the Greenlee soils. Reinforcement planting may be necessary on the Greenlee soils.

The Tate soils that have a slope of less than 15 percent are suited to most of the field and truck crops commonly grown in the county. The slope and the hazard of erosion are the main limitations. Conservation tillage, contour farming, grassed waterways, and field borders help to control erosion. Returning crop residue to the soils and planting winter cover crops increase the content of organic matter and thus improve fertility, the available water capacity, and tilth.

The Tate soils that have a slope of more than 15 percent and the Greenlee soils are unsuited to cultivated crops. The slope increases the hazard of erosion and limits the use of equipment. Rock fragments on and below the surface make conventional tillage impractical in areas of the Greenlee soils. The content of rock fragments throughout the Greenlee soils is so high that removing the fragments from the surface does not make cultivation practical.

The Tate soils are well suited to pasture and hay in areas where the slope is less than 15 percent and are suited in areas where the slope is more than 15 percent. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods are good management practices. The Greenlee soils are unsuited to pasture and hay. Rock fragments on and below the surface hinder mowing. Vehicles must be operated over carefully chosen routes.

The Tate soils that have a slope of less than 15 percent are suited to most urban uses. Practices that help to control erosion and sedimentation are needed in unvegetated areas to prevent offsite damage. The Tate soils that have a slope of more than 15 percent and the Greenlee soils are poorly suited to most urban uses because of the slope of both soils and the rock fragments throughout the Greenlee soils.

6. Ditney-Junaluska-Brasstown-Unicoi

Strongly sloping to very steep, well drained or somewhat excessively drained soils that have a loamy subsoil; formed in material weathered from quartzite and phyllite; on uplands in the mountains

The landscape of this map unit is characterized by strongly sloping or moderately steep soils on narrow, winding ridgetops separated by steep or very steep soils on long mountain side slopes. The Junaluska and Brasstown soils have few rock fragments on the surface. Rock fragments on the surface of the Ditney and Unicoi soils range from boulders to cobbles, average about 18 inches in diameter, and are about 3 to 25 feet apart. Slopes range from 6 to 95 percent. Rapidly flowing streams that often dry up during summer follow winding courses through narrow flood plains.

Most of this map unit is used as woodland. Most roads are parallel to the ridgetops or on the contour of side slopes.

This map unit makes up about 6 percent of the county. It is about 25 percent Ditney soils, 22 percent Junaluska soils, 14 percent Brasstown soils, 11 percent Unicoi soils, and 28 percent soils of minor extent.

The moderately steep to very steep Ditney soils are moderately deep over hard rock. Typically, these soils have a surface layer of gravelly fine sandy loam.

The strongly sloping to steep Junaluska soils are moderately deep over soft bedrock. Typically, these soils have a surface layer of channery fine sandy loam.

The strongly sloping to steep Brasstown soils are deep over soft bedrock. Typically, these soils have a surface layer of channery fine sandy loam.

The moderately steep to very steep Unicoi soils are shallow over hard rock. Typically, these soils have a surface layer of gravelly fine sandy loam. They average more than 35 percent rock fragments throughout.

The minor soils include Soco, Lonon, Northcove, Potomac, and Rabun soils. Soco soils are on ridgetops and side slopes and are moderately deep over soft bedrock. Lonon and Northcove soils are on foot slopes, benches, and fans and are very deep. They formed in colluvium. Northcove soils have more than 35 percent rock fragments throughout. Potomac soils are on narrow flood plains and are very deep. They formed in alluvium. They have predominantly sandy underlying material that has more than 35 percent rock fragments throughout. Rabun soils are on ridgetops and side slopes and are very deep. They have a clayey subsoil. Also of minor extent are areas of rock outcrop on some shoulder slopes.

The major soils are suited to trees. Overstory trees include chestnut oak, scarlet oak, pitch pine, Table Mountain pine, eastern white pine, red maple, and Virginia pine. Understory plants include mountain laurel, blueberry, blackgum, sourwood, greenbrier, azalea, and galax. The quality of the woodland is relatively low because of low natural fertility, low precipitation, forest fires, and other factors.

The slope is the main limitation affecting woodland management. It increases the hazard of erosion and limits the use of equipment. Extreme caution is needed when vehicles are operated on these soils. In most areas extensive grading is needed to establish roads or trails. Logging roads and skid trails should be laid out on the contour. Water bars break the flow of water along roads. In exposed areas applying lime and fertilizer and seeding help to control erosion. Cable logging reduces the hazard of erosion and eliminates the need for most skid trails and logging roads. The slope, the depth to bedrock, droughtiness, and rock fragments on the surface are the main limitations.

The depth to bedrock results in a moderate hazard of windthrow in areas of the Ditney and Junaluska soils and a severe hazard of windthrow in areas of the Unicoi soils. Thinning should be held to a minimum, or the stand should not be thinned at all. A plan for the periodic removal of windthrown trees is advisable. The seedling mortality rate is moderate in areas of the droughty Ditney and Unicoi soils. Reinforcement planting may be needed. Rock fragments on the surface are a limitation in areas of the Ditney and Unicoi soils. Wheeled tractors and vehicles that have high ground clearance can be operated only over carefully chosen routes.

The major soils are generally unsuited to cultivated crops because of the slope. The depth to bedrock, droughtiness, and rock fragments on the surface also are limitations in areas of the Ditney and Unicoi soils. The Junaluska and Brasstown soils that have a slope of 6 to 25 percent are poorly suited to cultivated crops. The slope is the main limitation. The hazard of erosion is severe.

The major soils are generally unsuited to pasture and hay in areas where the slope is more than 25 percent. Droughtiness and rock fragments on the surface also are limitations in areas of the Ditney and Unicoi soils. The Junaluska and Brasstown soils that have a slope of 6 to 25 percent are suited to pasture and hay. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods are good management practices.

The major soils are generally unsuited to most urban uses. The slope is the main limitation. The depth to bedrock also is a limitation in areas of the Ditney, Junaluska, and Unicoi soils. Droughtiness and rock fragments at or near the surface are limitations in areas of the Ditney and Unicoi soils. The Junaluska and Brasstown soils that have a slope of 6 to 25 percent are poorly suited to most urban uses. Substantial cutting and filling are needed. Extensive erosion-control measures are needed after construction is completed.

7. Ashe-Cleveland-Rock Outcrop

Areas of Rock outcrop and areas of very steep, somewhat excessively drained soils that have a loamy subsoil and formed in material weathered from gneiss and schist; on uplands in the mountains

The landscape of this map unit is characterized by very steep soils on mountain side slopes and by Rock outcrop in areas of cliffs. Stones and boulders are on the surface of the Ashe and Cleveland soils. The Rock outcrop is intricately mixed with areas of the Ashe and Cleveland soils. It generally is on the steepest part of the landscape. Slopes range from 60 to 95 percent.

Most of this map unit supports low-grade hardwoods and pine. Few roads are in areas of this map unit.

This map unit makes up about 1 percent of the county. It is about 40 percent Ashe soils, 30 percent Cleveland soils, 20 percent Rock outcrop, and 10 percent soils of minor extent.

Ashe soils are on the smooth parts of side slopes away from the Rock outcrop. These soils are moderately deep over hard bedrock. Typically, they have a surface layer of gravelly sandy loam.

Cleveland soils are adjacent to the Rock outcrop. These soils are shallow over hard bedrock. Typically, they have a surface layer of gravelly sandy loam.

The minor soils include Chestnut, Porters, Cullasaja, and Greenlee soils. Chestnut soils have soft bedrock at a depth of 20 to 40 inches and are on the smooth parts of slopes away from the Rock outcrop. Porters soils have a dark surface layer that is at least 7 inches thick and are intermingled with areas of the major soils and Rock outcrop at elevations above about 3,600 feet. The colluvial Cullasaja and Greenlee soils average more than 35 percent rock fragments throughout. They are on benches and small fans beneath areas of the Rock outcrop.

This map unit is unsuited to the commercial production of trees. Overstory trees include scarlet oak, chestnut oak, blackjack oak, northern red oak, Table Mountain pine, pitch pine, and Virginia pine. Understory plants include mountain laurel, rhododendron, blueberry, galax, Carolina hemlock, and sourwood.

The slope, the depth to bedrock, the Rock outcrop, droughtiness, and rock fragments on the surface are the main limitations affecting woodland management. The slope increases the hazard of erosion and limits the use of equipment. Operating wheeled or tracked vehicles is hazardous. Extreme care is needed when routes are chosen. Cable logging reduces the hazard of erosion and eliminates the need for skid trails and logging roads. The depth to bedrock results in a moderate hazard of windthrow in areas of the Ashe soils and a severe hazard of windthrow in areas of the Cleveland soils. The seedling mortality rate is moderate.

This map unit is unsuited to cultivated crops, pasture, hay, and urban uses because of the slope, the depth to bedrock, rock fragments on the surface, and the Rock outcrop.

8. Northcove-Lonon

Strongly sloping to steep, well drained soils that have a loamy subsoil; formed in colluvium weathered from quartzite and phyllite; on foot slopes, benches, and fans in the mountains

The landscape of this map unit is characterized by strongly sloping soils at the base of mountains and moderately steep or steep soils farther up the side of the mountain and along drainageways that are notched into side slopes. Rock fragments on the surface range from boulders to cobbles, average about 12 to 18 inches in diameter, and are about 3 to 80 feet apart. Slopes range from 6 to 45 percent. Rapidly flowing streams that often dry up during summer follow winding courses out of the mountains.

Most of this map unit is used as woodland. A few areas are used as pasture or homesites. Most roads are on the contour of the slopes at the base of the mountains.

This map unit makes up about 2 percent of the county. It is about 50 percent Northcove soils, 33 percent Lonon soils, and 17 percent soils of minor extent.

The strongly sloping to steep Northcove soils are in the more stony parts of mapped areas adjacent to intermittent streams that cross the mapped areas. These soils are very deep. Typically, they have a surface layer of very cobbly sandy loam. They average 35 percent rock fragments throughout.

The strongly sloping Lonon soils are in the less stony parts of mapped areas and are on the more stable parts of the landscape between drainageways. These soils are very deep. Typically, they have a surface layer of fine sandy loam.

The minor soils include Junaluska, Brasstown, and Potomac soils. Junaluska and Brasstown soils formed in residuum and are on narrow remnants of ridges on some of the larger fans. Junaluska soils have soft bedrock at a depth of 20 to 40 inches. Brasstown soils have soft bedrock at a depth of 40 to 60 inches. Potomac soils are coarser textured than the major soils and are on flood plains.

The Northcove soils are moderately suited to woodland, and the Lonon soils are well suited. Overstory trees include chestnut oak, scarlet oak, pitch pine, yellow-poplar, white oak, eastern white pine, and Virginia pine. Understory plants include rhododendron, mountain laurel, Fraser magnolia, dog hobble, Christmas fern, galax, white snakeroot, greenbrier, honeysuckle, blueberry, blackberry, poison ivy, sourwood, flowering dogwood, and wild grape. The quality of the woodland is relatively low because of low natural fertility, low precipitation, forest fires, and other factors.

No significant limitations affect woodland management in areas of the Lonon soils. Rock fragments on and below the surface are the main limitation affecting woodland management in areas of the Northcove soil. They reduce the amount of moisture available to plants, increase the seedling mortality rate, and limit the use of equipment. Wheeled tractors and vehicles that have high ground clearance can be

operated only over carefully chosen routes in areas of the Northcove soils. Reinforcement planting may be necessary on the Northcove soil.

The major soils are unsuited to most of the field and truck crops commonly grown in the county. The slope and rock fragments on the surface are the main limitations. The slope results in a hazard of erosion. The rock fragments make conventional tillage impractical. Where the fragments are removed from the surface, the Lonon soils are moderately suited to crop production. The content of rock fragments throughout the Northcove soils is so high that removing the fragments from the surface does not make cultivation practical.

The major soils generally are unsuited to pasture and hay. Rock fragments on the surface hinder mowing. Vehicles must be operated over carefully chosen routes. The Lonon and Northcove soils that have a slope of less than 25 percent are suited to pasture and hay in areas where the rock fragments have been removed from the surface.

The Northcove soils are poorly suited to most urban uses. The slope and the rock fragments throughout are the main limitations. The Lonon soils are moderately suited to most urban uses. The slope is the main limitation affecting urban uses in areas of the Lonon soils. Management practices are needed in unvegetated areas of the Lonon soils to help to control erosion and offsite damage caused by sedimentation.

Detailed Soil Map Units

The map units on the detailed soil maps at the back of this survey represent the soils in the survey area. The map unit descriptions in this section, along with the soil maps, can be used to determine the suitability and potential of the soils within a map unit for specific uses. They also can be used to plan the management needed for those uses. More information on each map unit is given under the heading "Use and Management of the Soils."

The map units on the detailed soil maps represent areas on the landscape and consist mainly of one or more soils for which the units are named.

Symbols identifying the map unit precede the map unit name in the soil description. Each description includes general facts about the soils and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the underlying material, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, stoniness, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are named as phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Hayesville loam, 6 to 15 percent slopes, is a phase of the Hayesville series.

Some map units are named for two or more major soils. These map units are called soil complexes. A *soil complex* consists of two or more named soils in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Chestnut-Ashe complex, 10 to 25 percent slopes, stony, is an example.

Most map units include small scattered areas of soils other than those for which the map unit is named. Some of these included soils have properties that differ substantially from those of the major soil or soils. Such differences could significantly affect use and management of the soils in the map unit. The included soils are identified in each map unit description. Some small areas of strongly contrasting soils are identified by a special symbol on the soil maps.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Urban land is an example. Miscellaneous areas are shown on the soil maps. Some that are too small to be shown are identified by a special symbol on the soil maps.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables") give properties of the soils and the limitations, capabilities, and suitabilities for many uses. The Glossary defines many of the terms used in describing the soils.

AcF—Ashe-Cleveland-Rock outcrop complex, 60 to 95 percent slopes. This map unit occurs mainly as areas of somewhat excessively drained, very steep Ashe and Cleveland soils and areas of Rock outcrop. The unit is on side slopes in the mountains. It is about 40 percent moderately deep Ashe soil, 30 percent shallow Cleveland soil, and 20 percent Rock outcrop. Stones and boulders are on the surface of the Ashe and Cleveland soils. The Rock outcrop and Ashe and Cleveland soils occur as areas so intricately mixed that mapping them separately was not practical at the selected scale. Individual areas are irregular in shape and range from about 10 to 300 acres in size.

The Ashe soil is on the smooth parts of side slopes away from the Rock outcrop. The Cleveland soil is adjacent to the Rock outcrop. The Rock outcrop is in scattered areas throughout the map unit, generally on the steepest part of the landscape.

Typically, the surface layer of the Ashe soil is gravelly sandy loam. In the upper 3 inches, it is dark brown. In the lower 4 inches, it is yellowish brown. The subsoil is yellowish brown sandy loam 13 inches thick. The underlying material extends to a depth of 24 inches. It is yellowish brown saprolite that has a texture

of sandy loam. Soft gneiss bedrock is between depths of 24 and 30 inches. Hard gneiss bedrock is at a depth of 30 inches.

Permeability is moderately rapid in the Ashe soil. Surface runoff is rapid in bare or unprotected areas. The shrink-swell potential is low in the subsoil. The depth to hard bedrock is 20 to 40 inches. The seasonal high water table is below a depth of 6 feet.

Typically, the surface layer of the Cleveland soil is dark grayish brown gravelly sandy loam 5 inches thick. The subsoil is yellowish brown gravelly sandy loam 12 inches thick. Hard gneiss bedrock is at a depth of 17 inches.

Permeability is moderately rapid in the Cleveland soil. Surface runoff is rapid in bare or unprotected areas. The shrink-swell potential is low in the subsoil. The depth to hard bedrock is 10 to 20 inches. The seasonal high water table is below a depth of 6 feet.

The areas of Rock outcrop include knobs, peaks, and vertical cliffs that have overhangs. New areas of Rock outcrop may be exposed by landslides during periods of extremely heavy rainfall.

Included in this unit in mapping are small areas of Chestnut, Porters, Cullasaja, and Greenlee soils. Chestnut soils have soft bedrock at a depth of 20 to 40 inches. They are on the smooth parts of slopes away from the Rock outcrop. Porters soils have a dark surface layer that is at least 7 inches thick. They are intermingled with areas of the Ashe and Cleveland soils and Rock outcrop at elevations above about 3,600 feet. The colluvial Cullasaja and Greenlee soils average more than 35 percent rock fragments throughout. They are on benches and small colluvial fans beneath areas of the Rock outcrop. Included soils make up about 10 percent of the map unit.

All of the acreage in this map unit supports low-grade hardwoods and pine.

This map unit is unsuited to the commercial production of trees. Overstory trees include scarlet oak, chestnut oak, blackjack oak, northern red oak, Table Mountain pine, pitch pine, and Virginia pine. Understory plants include mountain laurel, rhododendron, blueberry, galax, Carolina hemlock, and sourwood.

The slope, the depth to bedrock, the Rock outcrop, droughtiness, and rock fragments on the surface are the main limitations affecting woodland management. The slope increases the hazard of erosion and limits the use of equipment. Operating wheeled or tracked vehicles is hazardous. Extreme care is needed when routes are chosen. Cable logging reduces the hazard of erosion and eliminates the need for skid trails and logging roads. The depth to bedrock results in a moderate hazard of windthrow in areas of the Ashe soil and a severe hazard of windthrow in areas of the Cleveland soil. The seedling mortality rate is moderate.

This map unit is unsuited to cultivated crops, pasture, hay, and urban uses because of the slope, the depth to bedrock, rock fragments on the surface, and the Rock outcrop.

The capability subclass is VIIe in areas of the Ashe and Cleveland soils and VIIIs in areas of the Rock outcrop. Based on chestnut oak as the indicator species, the woodland ordination symbol is 3R in areas of the Ashe soil and 2R in areas of the Cleveland soil. The Rock outcrop has not been assigned a woodland ordination symbol.

BmA—Biltmore loamy fine sand, 0 to 3 percent slopes, occasionally flooded. This map unit consists mainly of very deep, well drained and moderately well drained, nearly level Biltmore and similar soils on flood plains adjacent to the larger streams. Most areas are long and narrow and range from about 4 to 50 acres in size.

Typically, the surface layer is dark yellowish brown loamy fine sand 10 inches thick. The underlying material extends to a depth of 60 inches. In the upper 34 inches, it is yellowish brown loamy sand. In the next 6 inches, it is dark yellowish brown sandy loam. In the lower 10 inches, it is stratified yellowish brown, dark yellowish brown, and light gray sand.

Permeability is rapid. Surface runoff is slow. The shrink-swell potential is low in the underlying material. The depth to bedrock is more than 6 feet. The seasonal high water table is 3.5 to 6.0 feet below the surface. This soil is occasionally flooded for brief periods.

Included in this unit in mapping are small areas of Rosman, Iotla, Colvard, and Potomac soils. The dominantly loamy Rosman and Colvard soils are away from stream channels, commonly in the slightly higher landscape positions. The somewhat poorly drained Iotla soils are in depressions. Potomac soils average more than 35 percent rock fragments throughout. They are on the higher parts of the mapped areas that have high stream velocity and multiple stream channels. Included soils make up about 20 percent of the map unit.

Most of the acreage in this map unit is used as woodland.

This map unit is moderately suited to woodland. Overstory trees include American sycamore, green ash, red maple, yellow-poplar, river birch, black walnut, and black willow. Understory plants include alder, American hornbeam, black cherry, greenbrier, honeysuckle, blackberry, giant cane, poison ivy, and wild grape.

The sandy topsoil is the main limitation affecting woodland. It increases the seedling mortality rate and limits the use of equipment. Reinforcement planting may be necessary. The occasional flooding limits the

use of planting and harvesting equipment. Logging equipment should be operated only during dry periods.

This map unit is moderately suited to most of the field and truck crops commonly grown in the county. In most areas droughtiness and the occasional flooding are management concerns. Returning crop residue to the soil and planting winter cover crops increase the content of organic matter and thus improve fertility, the available water capacity, and tilth.

This map unit is moderately suited to pasture and hay. In most areas droughtiness and the occasional flooding are management concerns. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

This map unit is poorly suited to most urban uses. The occasional flooding and the seasonal wetness are severe limitations. Some areas can be used for recreational purposes that are not so seriously affected by the seasonal wetness and the flooding. Examples are ball fields and playgrounds.

The capability subclass is IIIs. Based on yellow-poplar as the indicator species, the woodland ordination symbol is 8S.

BrB2—Braddock clay loam, 2 to 6 percent slopes, eroded. This map unit consists mainly of very deep, well drained, gently sloping Braddock and similar soils on high stream terraces along many of the larger streams. Most areas are somewhat elongated and range from about 4 to 30 acres in size.

Typically, the surface layer is reddish brown clay loam 7 inches thick. The upper 18 inches of the subsoil is red clay. The next 21 inches is yellowish red clay. The lower 14 inches is yellowish red gravelly clay loam. In some uneroded areas the surface layer is loam. In a few scattered areas, the subsoil is dark red or brown.

Permeability is moderate. Surface runoff is medium in bare or unprotected areas. The shrink-swell potential is moderate in the subsoil. The depth to bedrock is more than 6 feet. The seasonal high water table is below a depth of 6 feet.

Included in this unit in mapping are small areas of Elsinboro and Dillard soils. The predominantly loamy Elsinboro soils are on low parts of the landscape. The moderately well drained Dillard soils are along small drainageways that cross the mapped areas and in depressions. Also included are a few areas near Old Fort that have been developed for urban uses. Included areas make up about 15 percent of the map unit.

Most of the acreage in this map unit is used as pasture, hayland, or cropland.

This map unit is moderately suited to trees. Overstory trees include scarlet oak, northern red oak, white oak, red maple, eastern white pine, yellow-poplar, and Virginia pine. Understory plants include greenbrier, honeysuckle, blackberry, poison ivy, sourwood, American holly, flowering dogwood, and wild grape.

Depth to the clayey part of the subsoil and the texture of the topsoil are the main limitations affecting woodland management. The depth to the clayey part of the subsoil limits the use of equipment. Logging equipment should be operated only during dry periods. The clay loam in the surface layer increases the seedling mortality rate. Reinforcement planting may be necessary.

This map unit is well suited to most of the field and truck crops commonly grown in the county. The texture of the topsoil, the hazard of erosion, and the slope are management concerns. If the soil is tilled when too wet or too dry, clods form and seed germination may not be uniform across the field. Conservation tillage, contour farming, stripcropping, cover crops, crop residue management, grassed waterways, and field borders improve tilth, conserve moisture, help to control erosion, and minimize the offsite damage caused by sedimentation.

This map unit is well suited to pasture and hay. The clay loam in the surface layer can limit the establishment of sod. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

This map unit is moderately suited to most urban uses. A high content of clay, the moderate permeability, the moderate shrink-swell potential, and low strength in the subsoil are the main limitations. The moderate permeability in the subsoil can be overcome by increasing the size of the absorption area in septic tank absorption fields. Structural or road damage can be prevented by designing roads, foundations, and footings so that they can withstand the shrinking and swelling of the subsoil, by diverting runoff away from buildings, and by backfilling with material that has a low shrink-swell potential.

If this soil is used as a base for roads and streets, a mixture of sand and gravel and proper compaction are needed to increase strength and stability. A gravel base and an adequate wearing surface improve trafficability for year-round use.

The capability subclass is IIIe. Based on yellow-poplar as the indicator species, the woodland ordination symbol is 6C.

BrC2—Braddock clay loam, 6 to 15 percent slopes, eroded. This map unit consists mainly of very deep, well drained, strongly sloping Braddock and similar soils on mountain foot slopes and high stream terraces. Most

areas are somewhat elongated and range from about 4 to 75 acres in size.

Typically, the surface layer is reddish brown clay loam 7 inches thick. The upper 18 inches of the subsoil is red clay. The next 21 inches is yellowish red clay. The lower 14 inches is yellowish red gravelly clay loam. In some uneroded areas the surface layer is loam. In a few scattered areas, the subsoil is dark red or brown.

Permeability is moderate. Surface runoff is medium or rapid in bare or unprotected areas. The shrink-swell potential is moderate in the subsoil. The depth to bedrock is more than 6 feet. The seasonal high water table is below a depth of 6 feet.

Included in this unit in mapping are small areas of Hayesville, Elsinboro, Tate, and Dillard soils. Hayesville soils formed in residuum. They are on nose slopes and knobs. The predominantly loamy Elsinboro soils are on low parts of the landscape. Tate soils have a loamy subsoil. They are along intermittent drains. The moderately well drained Dillard soils are along small drainageways that cross mapped areas and in depressions. Also included are a few areas near Old Fort that have been developed for urban uses. Included areas make up about 15 percent of the map unit.

Most of the acreage in this map unit is used as pasture, hayland, or cropland.

This map unit is moderately suited to woodland. Overstory trees include scarlet oak, northern red oak, white oak, red maple, eastern white pine, yellow-poplar, pitch pine, and Virginia pine. Understory plants include greenbrier, honeysuckle, blackberry, poison ivy, sourwood, American holly, flowering dogwood, and wild grape.

Depth to the clayey part of the subsoil and the texture of the topsoil are the main limitations affecting woodland use. The depth to the clayey part of the subsoil limits the use of equipment. Logging equipment should be operated only during dry periods. The clay loam in the topsoil increases the seedling mortality rate. Reinforcement planting may be necessary.

This map unit is moderately suited to most of the field and truck crops commonly grown in the county. The texture of the topsoil, the hazard of erosion, and the slope are management concerns. If the soil is tilled when too wet, clods form and seed germination may not be uniform across the field. Conservation tillage, contour farming, stripcropping, cover crops, crop residue management, grassed waterways, and field borders improve tilth, conserve moisture, help to control erosion, and minimize the offsite damage caused by sedimentation.

This map unit is well suited to pasture and hay. The slope and the texture of the surface layer can limit the establishment of sod. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

This map unit is moderately suited to most urban uses. The slope, a high content of clay, the moderate permeability, the moderate shrink-swell potential, and low strength in the subsoil are the main limitations. The moderate permeability in the subsoil can be overcome by increasing the size of the absorption area in septic tank absorption fields. Structural or road damage can be prevented by designing roads, foundations, and footings so that they can withstand the shrinking and swelling of the subsoil, by diverting runoff away from buildings, and by backfilling with material that has a low shrink-swell potential.

If this soil is used as a base for roads and streets, a mixture of sand and gravel and proper compaction are needed to increase strength and stability. A gravel base and an adequate wearing surface improve trafficability for year-round use.

The capability subclass is IVe. Based on yellow-poplar as the indicator species, the woodland ordination symbol is 6C.

BrD2—Braddock clay loam, 15 to 25 percent slopes, eroded. This map unit consists mainly of very deep, well drained, moderately steep Braddock and similar soils on mountain foot slopes, colluvial fans, and high stream terraces. Most areas are somewhat elongated and range from about 4 to 25 acres in size.

Typically, the surface layer is reddish brown clay loam 7 inches thick. The upper 18 inches of the subsoil is red clay. The next 21 inches is yellowish red clay. The lower 14 inches is yellowish red gravelly clay loam. In some uneroded areas the surface layer is loam. In a few scattered areas, the subsoil is dark red or brown.

Permeability is moderate. Surface runoff is rapid in bare or unprotected areas. The shrink-swell potential is moderate in the subsoil. The depth to bedrock is more than 6 feet. The seasonal high water table is below a depth of 6 feet.

Included in this unit in mapping are small areas of Hayesville and Tate soils. Hayesville soils formed in residuum. They are on nose slopes. Tate soils have a loamy subsoil. They are along drainageways. Also included are a few areas near Old Fort that have been developed for urban uses. Included areas make up about 15 percent of the map unit.

Most of the acreage in this map unit is used as pasture or hayland.

This map unit is moderately suited to woodland. Overstory trees include scarlet oak, northern red oak, white oak, red maple, eastern white pine, yellow-poplar, pitch pine, and Virginia pine. Understory plants include

greenbrier, honeysuckle, blackberry, poison ivy, sourwood, American holly, flowering dogwood, and wild grape.

The slope, depth to the clayey part of the subsoil, and the texture of the topsoil are the main limitations affecting woodland management. The slope and depth to the clayey part of the subsoil limit the use of equipment. Logging roads and skid trails should be laid out on the contour. Water bars break the flow of water along roads. In exposed areas applying lime and fertilizer and seeding help to control erosion. Logging equipment should be operated only during dry periods. The clay loam in the surface layer increases the seedling mortality rate. Reinforcement planting may be needed.

This map unit is poorly suited to most of the field and truck crops commonly grown in the county. The slope and the hazard of erosion are the main management concerns.

This map unit is moderately suited to pasture and hay. The slope is the main limitation. The texture of the surface layer can limit the establishment of sod. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

This map unit is poorly suited to most urban uses because of the slope. A high content of clay, the moderate permeability, the moderate shrink-swell potential, and low strength in the subsoil also are limitations. Extensive cutting and filling and detailed site planning are required. The moderate permeability in the subsoil can be overcome by increasing the size of the absorption area in septic tank absorption fields. Structural or road damage can be prevented by designing roads, foundations, and footings so that they can withstand the shrinking and swelling of the subsoil, by diverting runoff away from buildings, and by backfilling with material that has a low shrink-swell potential.

If this soil is used as a base for roads and streets, a mixture of sand and gravel and proper compaction are needed to increase strength and stability. A gravel base and an adequate wearing surface improve trafficability for year-round use.

The capability subclass is VIe. Based on yellow-poplar as the indicator species, the woodland ordination symbol is 6R.

CaD—Chestnut-Ashe complex, 10 to 25 percent slopes, stony. This map unit consists mainly of a moderately deep, well drained, moderately steep Chestnut soil and a moderately deep, somewhat excessively drained, moderately steep Ashe soil. These soils are on ridgetops in the mountains. Rock fragments on the surface range from boulders to cobbles, average about 1 foot in diameter, and are about 25 to 80 feet apart. The unit is about 45 percent Chestnut soil and 35 percent Ashe soil. The two soils occur as areas so intricately mixed that mapping them separately was not practical at the selected scale. Individual areas are long and narrow or irregularly shaped and range from about 5 to 50 acres in size.

The Chestnut soil typically is on the smooth, wide parts of ridgetops. The Ashe soil typically is on knobs and the narrow parts of ridgetops. In many places both soils are in the same landscape position.

Typically, the surface layer of the Chestnut soil is brown gravelly sandy loam 5 inches thick. The subsoil is strong brown sandy loam 30 inches thick. Soft gneiss bedrock is at a depth of 35 to 60 inches.

Permeability is moderately rapid in the Chestnut soil. Surface runoff is rapid in bare or unprotected areas. The shrink-swell potential is low in the subsoil. The depth to soft bedrock is 20 to 40 inches. The seasonal high water table is below a depth of 6 feet.

Typically, the surface layer of the Ashe soil is gravelly sandy loam. In the upper 3 inches, it is dark brown. In the lower 4 inches, it is yellowish brown. The subsoil is yellowish brown sandy loam 13 inches thick. The underlying material extends to a depth of 24 inches. It is yellowish brown saprolite that has a texture of sandy loam. Soft gneiss bedrock is between depths of 24 and 30 inches. Hard gneiss bedrock is at a depth of 30 inches.

Permeability is moderately rapid in the Ashe soil. Surface runoff is rapid in bare or unprotected areas. The shrink-swell potential is low in the subsoil. The depth to hard bedrock is 20 to 40 inches. The seasonal high water table is below a depth of 6 feet.

Included in this unit in mapping are small intermingled areas of Edneyville, Porters, Cleveland, and Cowee soils. The very deep Edneyville soils are on the broad and smooth parts of ridgetops. Porters soils have a darker surface layer than that of the Chestnut and Ashe soils and are at elevations above 3,600 feet. The shallow Cleveland soils are on knobs. The finer textured Cowee soils are at elevations below 3,000 feet. Also included are areas scattered throughout the map unit that are very stony or very bouldery or that have rock outcrops. Included areas make up about 20 percent of the map unit.

Most of the acreage in this map unit is used as woodland.

This map unit is moderately suited to trees. Overstory trees include scarlet oak, chestnut oak, white oak, northern red oak, pitch pine, Table Mountain pine, Virginia pine, and eastern white pine. Understory plants include mountain laurel, rhododendron, blueberry,

sourwood, flowering dogwood, greenbrier, azalea, wild grape, and galax.

The slope and the depth to bedrock are the main limitations affecting woodland management. The slope increases the hazard of erosion and limits the use of equipment. Logging roads and skid trails should be laid out on the contour. Water bars break the flow of water along roads. In exposed areas applying lime and fertilizer and seeding help to control erosion. The depth to bedrock increases the hazard of windthrow. Thinning should be held to a minimum, or the stand should not be thinned at all. A plan for the periodic removal of windthrown trees is advisable. Droughtiness increases the seedling mortality rate on the Ashe soil. Reinforcement planting may be needed.

This map unit is poorly suited to cultivated crops, pasture, and hay because of the slope, the depth to bedrock, and rock fragments on the surface. The slope results in a severe hazard of erosion. The depth to bedrock limits the thickness of the root zone and the amount of water available for plant growth. The rock fragments on the surface make cultivation impractical and mowing difficult.

This map unit is poorly suited to most urban uses. The slope, the depth to bedrock, and rock fragments on the surface are limitations.

The capability subclass is VIe. Based on chestnut oak as the indicator species, the woodland ordination symbol is 4R in areas of the Chestnut soil and 3R in areas of the Ashe soil.

CaF—Chestnut-Ashe complex, 25 to 80 percent slopes, stony. This map unit consists mainly of a moderately deep, well drained Chestnut soil and a moderately deep, somewhat excessively drained Ashe soil. These soils are on mountain ridgetops and side slopes. They are steep and very steep. Rock fragments on the surface range from boulders to cobbles, average about 1 foot in diameter, and are about 25 to 80 feet apart. The unit is about 45 percent Chestnut soil and 35 percent Ashe soil. The two soils occur as areas so intricately mixed that mapping them separately was not practical at the selected scale. Individual areas are irregular in shape and range from about 50 to 500 acres in size.

The Chestnut soil typically is on the smooth, lower parts of side slopes. The Ashe soil typically is on very narrow ridgetops, shoulder slopes, and bluffs adjacent to streams. In many places both soils are in the same landscape position.

Typically, the surface layer of the Chestnut soil is brown gravelly sandy loam 5 inches thick. The subsoil is strong brown sandy loam 30 inches thick. Soft gneiss bedrock is at a depth of 35 to 60 inches.

Permeability is moderately rapid in the Chestnut soil. Surface runoff is rapid in bare or unprotected areas. The shrink-swell potential is low in the subsoil. The depth to soft bedrock is 20 to 40 inches.

Typically, the surface layer of the Ashe soil is gravelly sandy loam. In the upper 3 inches, it is dark brown. In the lower 4 inches, it is yellowish brown. The subsoil is yellowish brown sandy loam 13 inches thick. The underlying material extends to a depth of 24 inches. It is yellowish brown saprolite that has a texture of sandy loam. Soft gneiss bedrock is between depths of 24 and 30 inches. Hard gneiss bedrock is at a depth of 30 inches.

Permeability is moderately rapid in the Ashe soil. Surface runoff is rapid in bare or unprotected areas. The shrink-swell potential is low in the subsoil. The depth to hard bedrock is 20 to 40 inches. The seasonal high water table is below a depth of 6 feet.

Included in this unit in mapping are small intermingled areas of Edneyville, Porters, Cleveland, Cowee, Greenlee, Cullasaja, and Tusquitee soils. The very deep Edneyville soils are on low side slopes. Porters soils have a darker surface layer than that of the Chestnut and Ashe soils and are at elevations above 3,600 feet. The shallow Cleveland soils are on shoulder slopes around bedrock escarpments. The finer textured Cowee soils are at elevations below 3,000 feet. The colluvial Greenlee, Cullasaja, and Tusquitee soils are along drainageways, on benches, and on foot slopes. Also included are scattered areas that are very stony or very bouldery and some areas of Rock outcrop on shoulder slopes. Included areas make up about 20 percent of the map unit.

Most of the acreage in this map unit is used as woodland.

This map unit is moderately suited to trees. Overstory trees include scarlet oak, chestnut oak, white oak, pitch pine, Table Mountain pine, Virginia pine, eastern white pine, northern red oak, black locust, and sweet birch. Understory plants include mountain laurel, rhododendron, blueberry, sourwood, Fraser magnolia, flowering dogwood, azalea, greenbrier, wild grape, and galax.

The slope and the depth to bedrock are the main limitations affecting woodland management. The slope increases the hazard of erosion and limits the use of equipment. Extreme caution is needed when vehicles are operated on these soils. In most areas extensive grading is needed to establish roads and trails. Logging roads and skid trails should be laid out on the contour. Water bars break the flow of water along roads. Cable logging reduces the hazard of erosion and eliminates the need for most skid trails and logging roads. In exposed areas applying lime and fertilizer and seeding

help to control erosion. The depth to bedrock increases the hazard of windthrow. Thinning should be held to a minimum, or the stand should not be thinned at all. A plan for the periodic removal of windthrown trees is advisable. Droughtiness increases the seedling mortality rate on the Ashe soil. Reinforcement planting may be necessary.

This map unit is unsuited to cultivated crops, pasture, hay, and most urban uses because of the slope, the depth to bedrock, and rock fragments on the surface.

The capability subclass is VIIe. Based on chestnut oak as the indicator species, the woodland ordination symbol is 4R in areas of the Chestnut soil and 3R in areas of the Ashe soil.

CoA—Colvard loam, 0 to 2 percent slopes, occasionally flooded. This map unit consists mainly of very deep, well drained, nearly level Colvard and similar soils on flood plains along small streams in the intermountain areas. Most areas are long and narrow and range from about 4 to 70 acres in size.

Typically, the surface layer is brown loam 8 inches thick. The underlying material extends to a depth of 60 inches. It is dark yellowish brown loam in the upper part, dark yellowish brown sandy loam in the next part, and pale brown loamy sand in the lower part.

Permeability is moderately rapid in the upper part of the underlying material and rapid in the lower part of the underlying material. Surface runoff is slow. The shrink-swell potential is low in the subsoil. The depth to bedrock is more than 5 feet. The seasonal high water table is 4 to 6 feet below the surface. This soil is occasionally flooded for very brief periods.

Included in this unit in mapping are small areas of Iotla, Biltmore, Elsinboro, and Potomac soils. The somewhat poorly drained Iotla soils are in depressions and at the base of uplands. The dominantly sandy Biltmore soils are adjacent to stream channels and on the inside of the curve at the turns of streams. The finer textured Elsinboro soils are in slightly elevated positions. Potomac soils have more than 35 percent rock fragments throughout. They are on the higher parts of the mapped areas where stream velocity is high. Also included are small areas that have a gravelly or cobbly surface layer. Included soils make up about 20 percent of the map unit.

Most of the acreage in this map unit is used as cropland.

This map unit is well suited to trees. Overstory trees include American sycamore, green ash, red maple, yellow-poplar, black walnut, river birch, Virginia pine, and black willow. Understory plants include alder, American hornbeam, black cherry, greenbrier, honeysuckle, blackberry, giant cane, poison ivy, and wild grape.

No significant limitations affect woodland management. The occasional flooding limits the use of planting and harvesting equipment. Logging equipment should be operated only during dry periods.

This map unit is well suited to most of the field and truck crops commonly grown in the county. The occasional flooding, however, is a management concern. Returning crop residue to the soil and planting winter cover crops increase the content of organic matter and thus improve fertility, the available water capacity, and tilth.

This map unit is well suited to pasture and hay. The occasional flooding, however, is a management concern. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

This map unit is poorly suited to most urban uses. The occasional flooding and the seasonal wetness are severe limitations. Some areas can be used for recreational purposes that are not so seriously affected by the seasonal wetness and the flooding. Examples are ball fields and playgrounds.

The capability subclass is IIw. Based on yellow-poplar as the indicator species, the woodland ordination symbol is 8A.

CrF—Craggey-Rock outcrop complex, 40 to 90 percent slopes. This map unit occurs mainly as areas of a somewhat excessively drained, shallow, steep and very steep Craggey soil and areas of Rock outcrop. The unit is on high mountain ridgetops and side slopes. It is about 45 percent Craggey soil and 40 percent Rock outcrop. Stones and boulders are on the surface of the Craggey soil. The Rock outcrop and Craggey soil occur as areas so intricately mixed that mapping them separately was not practical at the selected scale. Individual areas are irregular in shape and range from about 5 to 150 acres in size.

The Craggey soil is on the smooth parts of ridgetops and side slopes. The Rock outcrop is in scattered areas throughout the map unit, generally on the steepest parts of the landscape.

Typically, the surface layer of the Craggey soil is very dark grayish brown cobbly loam 10 inches thick. The subsoil is yellowish brown cobbly loam 6 inches thick. Hard mica gneiss bedrock is at a depth of 16 inches.

Permeability is moderately rapid in the Craggey soil. Surface runoff is rapid in bare or unprotected areas. The shrink-swell potential is low in the subsoil. The depth to hard bedrock is 10 to 20 inches. The seasonal

high water table is below a depth of 6 feet.

Included in this unit in mapping are small intermingled areas of Porters and Cleveland soils. Porters soils have hard bedrock at a depth of 40 to 60 inches. They are on the smooth slopes away from the Rock outcrop. Cleveland soils do not have a dark surface layer and are in south-facing positions. Also included are soils that are less than 10 inches deep over bedrock and are adjacent to the Rock outcrop. Included areas make up about 15 percent of the map unit.

All of the acreage in this map unit supports low-quality hardwoods and conifers.

This map unit is poorly suited to commercial production of trees. Overstory trees include northern red oak, yellow birch, American beech, red spruce, Fraser fir, yellow buckeye, pin cherry, red maple, American mountainash, and sugar maple. Understory plants include mountain laurel, blueberry, galax, rhododendron, azalea, New York fern, striped maple, and a wide array of wildflowers.

The slope, the depth to bedrock, rockiness, rock fragments on the surface, adverse weather conditions, and poor access are the main limitations affecting woodland management. The slope increases the hazard of erosion and limits the use of equipment. Operating wheeled or tracked vehicles is hazardous. Extreme care is needed when routes are chosen. In most areas extensive grading is needed to establish roads or trails. Logging roads and skid trails should be laid out on the contour. Water bars break the flow of water along roads. In exposed areas applying lime and fertilizer and seeding help to control erosion. The depth to bedrock in areas of the Craggey soil increases the hazard of windthrow. Trees are commonly broken or their growth is stunted by high winds or ice.

This map unit is unsuited to cultivated crops, pasture, hay, and urban uses because of the slope, the depth to bedrock, stones on the surface, and the Rock outcrop.

This map unit has considerable scenic value and a wide array of unique plant life. The climate and plant community are similar to those found in southern Canada.

The capability subclass is VIIe in areas of the Craggey soil and VIIIs in areas of the Rock outcrop. Based on northern red oak as the indicator species, the woodland ordination symbol is 2R in areas of the Craggey soil. The Rock outcrop has not been assigned a woodland ordination symbol.

CuE—Cullasaja-Tusquitee complex, 10 to 45 percent slopes. This map unit consists mainly of very deep, well drained, moderately steep and steep Cullasaja and Tusquitee soils on foot slopes, benches, and colluvial fans. Rock fragments on the surface of the Cullasaja soil range from boulders to cobbles, average about 18 inches in diameter, and are about 3 to 25 feet apart. Rock fragments on the surface of the Tusquitee soil range from boulders to cobbles, average about 1 foot in diameter, and are about 25 to 80 feet apart. The unit is about 55 percent Cullasaja soil and 25 percent Tusquitee soil. The two soils occur as areas so intricately mixed that mapping them separately was not practical at the selected scale. Most areas are long and narrow or irregular in shape and range from about 10 to 100 acres in size.

Typically, the Cullasaja soil is adjacent to streams and the Tusquitee soil is in the more stable areas between drainageways. In many places, however, both soils are in the same landscape position.

Typically, the surface layer of the Cullasaja soil is very cobbly loam. In the upper 2 inches, it is very dark brown. In the lower 9 inches, it is very dark grayish brown. The subsoil is dark yellowish brown very cobbly loam 19 inches thick. The underlying material extends to a depth of 63 inches. It is dark yellowish brown very cobbly sandy loam.

Permeability is moderately rapid in the Cullasaja soil. Surface runoff is medium or rapid in bare or unprotected areas. The shrink-swell potential is low in the subsoil. The depth to bedrock is more than 72 inches. The seasonal high water table is below a depth of 6 feet.

Typically, the surface layer of the Tusquitee soil is very dark grayish brown cobbly loam 8 inches thick. The next layer is brown loam 7 inches thick. The subsoil is 34 inches thick. It is brown loam in the upper part and strong brown loam in the lower part. The underlying material to a depth of 60 inches is strong brown loam.

Permeability is moderate in the Tusquitee soil. Surface runoff is medium or rapid in bare or unprotected areas. The shrink-swell potential is low in the subsoil. The depth to bedrock is more than 6 feet. The seasonal high water table is below a depth of 6 feet.

Included in this unit in mapping are small areas of Chestnut, Ashe, Maymead, Greenlee, and Potomac soils. Chestnut and Ashe soils formed in residuum and are along the edges of some mapped areas or on the narrow remnants of ridges on some of the larger colluvial fans. They have bedrock at a depth of 20 to 40 inches. Maymead and Greenlee soils are intermingled with areas of the Cullasaja and Tusquitee soils and do not have a dark surface layer that is at least 7 inches thick. Potomac soils are sandy and are on flood plains. Included soils make up about 20 percent of the map unit.

Most of the acreage in this map unit is used as woodland.

This map unit is moderately suited to woodland. Overstory trees include yellow-poplar, white oak, scarlet oak, eastern hemlock, northern red oak, sweet birch, yellow birch, black locust, and red maple. Understory plants include rhododendron, mountain laurel, Fraser magnolia, dog hobble, New York fern, Christmas fern, galax, white snakeroot, greenbrier, honeysuckle, blueberry, blackberry, poison ivy, sourwood, flowering dogwood, and wild grape.

The slope is the main limitation affecting woodland management. It increases the hazard of erosion and limits the use of equipment. In areas of the Cullasaja soil, wheeled tractors and vehicles that have high ground clearance can be operated only over carefully chosen routes. Logging roads and skid trails should be laid out on the contour. Water bars break the flow of water along roads. In exposed areas applying lime and fertilizer and seeding help to control erosion. Rock fragments on and below the surface also are a limitation in areas of the Cullasaja soil. The rock fragments in the Cullasaja soil reduce the amount of moisture available to plants.

This map unit is unsuited to most of the field and truck crops commonly grown in the county. The slope and rock fragments on the surface are the main limitations. The slope results in a severe hazard of erosion. The rock fragments make conventional tillage impractical.

This map unit generally is poorly suited to pasture and hay. Rock fragments on the surface and the slope are the main limitations. They hinder mowing. Vehicles must be operated over carefully chosen routes. The slope limits the establishment of sod. Areas where the rock fragments have been removed from the surface and that have a slope of less than 25 percent are suited to pasture and hay.

This map unit is poorly suited to most urban uses. The slope is the main limitation. Rock fragments throughout also are a limitation in areas of the Cullasaja soil.

The capability subclass is VIIs. Based on yellow-poplar as the indicator species, the woodland ordination symbol is 8R.

DdB—Dillard loam, 1 to 4 percent slopes, rarely flooded. This map unit consists mainly of very deep, moderately well drained, nearly level and gently sloping Dillard and similar soils on low stream terraces along many of the larger streams. Most areas are somewhat elongated and range from about 4 to 30 acres in size.

Typically, the surface layer is dark grayish brown loam 9 inches thick. In sequence downward, the subsoil is 4 inches of yellowish brown loam, 17 inches of yellowish brown clay loam that has brown and pale brown mottles, 14 inches of yellowish brown clay that has light brownish gray mottles, and 4 inches of mottled yellowish brown and light brownish gray clay loam. The underlying material to a depth of 60 inches is grayish brown loam that has yellowish brown mottles.

Permeability is moderately slow. Surface runoff is medium in bare or unprotected areas. The shrink-swell potential is low in the subsoil. The depth to bedrock is more than 6 feet. The seasonal high water table is 2 to 3 feet below the surface. This soil is subject to rare flooding for brief periods.

Included in this unit in mapping are small areas of Iotla, Elsinboro, Rosman, and Colvard soils. Iotla soils are somewhat poorly drained. They are on flood plains adjacent to streams. Elsinboro soils are well drained. They are on the high parts of the landscape. Rosman and Colvard soils are well drained and have substrata that are coarser textured than those of the Dillard soil. They are on flood plains adjacent to streams. Also included are small areas of poorly drained soils along drainageways and in depressions. Included soils make up about 15 percent of the map unit.

Most of the acreage in this map unit is used as cropland, pasture, or hayland.

This map unit is well suited to woodland. Overstory trees include scarlet oak, white oak, red maple, yellow-poplar, American sycamore, eastern white pine, and Virginia pine. Understory plants include greenbrier, honeysuckle, blackberry, poison ivy, sourwood, American holly, flowering dogwood, and wild grape. No significant limitations affect woodland use.

This map unit is well suited to most of the field and truck crops commonly grown in the county. Wetness, the slope, and the hazard of erosion are management concerns. Management of surface water can improve productivity. Conservation tillage, contour farming, cover crops, crop residue management, grassed waterways, and field borders improve tilth, conserve moisture, help to control erosion, and minimize the offsite damage caused by sedimentation.

This map unit is well suited to pasture and hay. Wetness, however, is a management concern. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

This map unit is poorly suited to most urban uses. Flooding, wetness, and low strength in the subsoil are the main limitations. If this soil is used as a base for roads and streets, a mixture of sand and gravel and proper compaction are needed to increase strength and stability. A gravel base and an adequate wearing surface improve trafficability for year-round use.

The capability subclass is IIw. Based on yellow-poplar as the indicator species, the woodland ordination symbol is 7A.

DuD—Ditney-Unicoi complex, 10 to 25 percent slopes, very stony. This map unit consists mainly of a moderately deep, well drained, moderately steep Ditney soil and a shallow, excessively drained, moderately steep Unicoi soil. These soils are on mountain ridgetops. Rock fragments on the surface range from boulders to cobbles, average about 18 inches in diameter, and are 3 to 25 feet apart. The unit is about 70 percent Ditney soil and 20 percent Unicoi soil. The two soils occur as areas so intricately mixed that mapping them separately was not practical at the selected scale. Individual areas are long and narrow or irregular in shape and range from about 5 to 50 acres in size.

The Ditney soil typically is on the smooth, wide parts of ridgetops. The Unicoi soil typically is on knobs or on narrow parts of ridgetops. In many places both soils are in the same landscape position.

Typically, the surface layer of the Ditney soil is gravelly fine sandy loam. In the upper 2 inches, it is very dark grayish brown. In the lower 5 inches, it is brown. The subsoil is yellowish brown cobbly fine sandy loam 20 inches thick. Hard quartzite bedrock is at a depth of 27 inches.

Permeability is moderately rapid in the Ditney soil. Surface runoff is rapid in bare or unprotected areas. The shrink-swell potential is low in the subsoil. The depth to hard bedrock is 20 to 40 inches. The seasonal high water table is below a depth of 6 feet.

Typically, the surface layer of the Unicoi soil is gravelly fine sandy loam. In the upper 2 inches, it is very dark grayish brown. In the lower 2 inches, it is brown. The subsoil is brownish yellow very cobbly sandy loam 8 inches thick. Hard quartzite bedrock is at a depth of 12 inches.

Permeability is moderately rapid in the Unicoi soil. Surface runoff is rapid in bare or unprotected areas. The shrink-swell potential is low in the subsoil. The depth to hard bedrock is 10 to 20 inches. The seasonal high water table is below a depth of 6 feet.

Included in this unit in mapping are small intermingled areas of Soco soils. These soils have soft bedrock between depths of 20 and 40 inches and have a few rock fragments on the surface. They are on broad ridgetops. Also included are common areas of Rock outcrop on some knobs and areas on some high knobs where adverse climatic conditions, such as high winds and ice, have stunted the growth of trees. Included areas make up about 10 percent of the map unit.

Most of the acreage in this map unit supports low-grade hardwoods and pine.

This map unit is moderately suited to trees. Overstory trees include chestnut oak, scarlet oak, pitch pine, Table Mountain pine, eastern white pine, and Virginia pine. Understory plants include mountain laurel, blueberry, blackgum, sourwood, greenbrier, and galax. The quality of the woodland is relatively low because of low natural fertility, droughtiness, forest fires, and other factors.

The slope, the depth to bedrock, droughtiness, and rock fragments on the surface are tne main limitations affecting woodland management. The slope increases the hazard of erosion and limits the use of equipment. Wheeled tractors and vehicles that have high ground clearance can be operated only over carefully chosen routes. Logging roads and skid trails should be laid out on the contour. Water bars break the flow of water along roads. In exposed areas applying lime and fertilizer and seeding help to control erosion. The depth to bedrock results in a moderate hazard of windthrow in areas of the Ditney soil and a severe hazard of windthrow in areas of the Unicoi soil. Thinning should be held to a minimum, or the stand should not be thinned at all. A plan for the periodic removal of windthrown trees is advisable. The seedling mortality rate is moderate. Reinforcement planting may be needed.

This map unit is unsuited to cultivated crops, pasture, hay, and most urban uses. The slope, the depth to bedrock, droughtiness, and rock fragments at or near the surface are the major limitations.

The capability subclass is VIe in areas of the Ditney soil and VIIs in areas of the Unicoi soil. Based on chestnut oak as the indicator species, the woodland ordination symbol is 2R.

DuF—Ditney-Unicoi complex, 25 to 80 percent slopes, very stony. This map unit consists mainly of a moderately deep, well drained Ditney soil and a shallow, excessively drained Unicoi soil. These soils are on ridgetops and mountain side slopes. They are steep and very steep. Rock fragments on the surface range from boulders to cobbles, average about 18 inches in diameter, and are about 3 to 25 feet apart. The unit is about 55 percent Ditney soil and 30 percent Unicoi soil. The two soils occur as areas so intricately mixed that mapping them separately was not practical at the selected scale. Individual areas are irregular in shape and range from about 5 to 500 acres in size.

The Ditney soil typically is on the smooth, lower side slopes. The Unicoi soil typically is on knobs, shoulder slopes, and bluffs adjacent to small streams and

drainageways. In many places both soils are in the same landscape position.

Typically, the surface layer of the Ditney soil is gravelly fine sandy loam. In the upper 2 inches, it is very dark grayish brown. In the lower 5 inches, it is brown. The subsoil is yellowish brown cobbly fine sandy loam 20 inches thick. Hard quartzite bedrock is at a depth of 27 inches.

Permeability is moderately rapid in the Ditney soil. Surface runoff is rapid in bare or unprotected areas. The shrink-swell potential is low in the subsoil. The depth to hard bedrock is 20 to 40 inches. The seasonal high water table is below a depth of 6 feet.

Typically, the surface layer of the Unicoi soil is gravelly fine sandy loam. In the upper 2 inches, it is very dark grayish brown. In the lower 2 inches, it is brown. The subsoil is brownish yellow very cobbly sandy loam 8 inches thick. Hard quartzite bedrock is at a depth of 12 inches.

Permeability is moderately rapid in the Unicoi soil. Surface runoff is rapid in bare or unprotected areas. The shrink-swell potential is low in the subsoil. The depth to hard bedrock is 10 to 20 inches. The seasonal high water table is below a depth of 6 feet.

Included in this unit in mapping are small intermingled areas of Soco and Northcove soils. Soco soils have soft bedrock between depths of 20 and 40 inches and have a few rock fragments on the surface. They are on the lower slopes. The colluvial Northcove soils are along drainageways, on benches, and on foot slopes. Also included are some areas of Rock outcrop on shoulder slopes. Included areas make up about 15 percent of the map unit.

Most of the acreage in this map unit supports low-grade hardwoods and pine.

This map unit is moderately suited to trees. Overstory trees include chestnut oak, scarlet oak, pitch pine, Table Mountain pine, eastern white pine, and Virginia pine. Understory plants include mountain laurel, blueberry, blackgum, sourwood, greenbrier, and galax. The quality of the woodland is relatively low because of low natural fertility, droughtiness, forest fires, and other factors.

The slope, the depth to bedrock, droughtiness, and rock fragments on the surface are the main limitations affecting woodland management. The slope increases the hazard of erosion and limits the use of equipment. Extreme caution is needed when vehicles are operated on these soils. Wheeled tractors and vehicles that have high ground clearance can be operated only over carefully chosen routes. In most areas extensive grading is needed to establish roads or trails. Logging roads and skid trails should be laid out on the contour. Water bars break the flow of water along roads. In exposed areas applying lime and fertilizer and seeding help to control erosion.

Cable logging reduces the hazard of erosion and eliminates the need for most skid trails and logging roads. The depth to bedrock results in a moderate hazard of windthrow in areas of the Ditney soil and a severe hazard of windthrow in areas of the Unicoi soil. Thinning should be held to a minimum, or the stand should not be thinned at all. A plan for the periodic removal of windthrown trees is advisable. The seedling mortality rate is moderate. Reinforcement planting may be needed.

This map unit is unsuited to cultivated crops, pasture, hay, and most urban uses because of the slope, the depth to bedrock, droughtiness, and rock fragments on or near the surface.

The capability subclass is VIIe. Based on chestnut oak as the indicator species, the woodland ordination symbol is 2R.

DxF—Ditney-Unicoi-Rock outcrop complex, 60 to 95 percent slopes. This map unit occurs mainly as areas of a moderately deep, well drained, very steep Ditney soil; a shallow, excessively drained Unicoi soil; and Rock outcrop. The unit is on mountain side slopes. It is about 40 percent Ditney soil, 30 percent Unicoi soil, and 20 percent Rock outcrop. Stones and boulders are on the surface of the Ditney and Unicoi soils. The Rock outcrop and Ditney and Unicoi soils occur as areas so intricately mixed that mapping them separately was not practical at the selected scale. Individual areas are irregular in shape and range from about 5 to 300 acres in size.

The Ditney soil is on the smooth side slopes away from the Rock outcrop. The Unicoi soil is adjacent to the Rock outcrop. The Rock outcrop is in scattered areas throughout the mapped areas, generally on the steepest part of the landscape.

Typically, the surface layer of the Ditney soil is gravelly fine sandy loam. In the upper 2 inches, it is very dark grayish brown. In the lower 5 inches, it is brown. The subsoil is yellowish brown cobbly fine sandy loam 20 inches thick. Hard quartzite bedrock is at a depth of 27 inches.

Permeability is moderately rapid in the Ditney soil. Surface runoff is rapid in bare or unprotected areas. The shrink-swell potential is low in the subsoil. The depth to hard bedrock is 20 to 40 inches. The seasonal high water table is below a depth of 6 feet.

Typically, the surface layer of the Unicoi soil is gravelly fine sandy loam. In the upper 2 inches, it is very dark grayish brown. In the lower 2 inches, it is

brown. The subsoil is brownish yellow very cobbly sandy loam 8 inches thick. Hard quartzite bedrock is at a depth of 12 inches.

Permeability is moderately rapid in the Unicoi soil. Surface runoff is rapid in bare or unprotected areas. The shrink-swell potential is low in the subsoil. The depth to hard bedrock is 10 to 20 inches. The seasonal high water table is below a depth of 6 feet.

The Rock outcrop occurs on very steep shoulder slopes or as vertical cliffs that have overhangs.

Included in this unit in mapping are small intermingled areas of Northcove soils. These colluvial soils are at the head of drainageways and on benches beneath areas of the Rock outcrop. Also included are soils that have bedrock at a depth of less than 10 inches and that are adjacent to the Rock outcrop. Included soils make up about 10 percent of the map unit.

All of the acreage in this map unit supports low-grade hardwoods and pine.

This map unit is poorly suited to trees. Overstory trees include chestnut oak, scarlet oak, pitch pine, Table Mountain pine, and Virginia pine. Understory plants include mountain laurel, blueberry, blackgum, sourwood, greenbrier, and galax. The quality of the woodland is relatively low because of low natural fertility, droughtiness, forest fires, and other factors (fig. 2).

The slope, the depth to bedrock, the Rock outcrop, droughtiness, rock fragments on the surface, and poor access are the main limitations affecting woodland management. The slope increases the hazard of erosion and limits the use of equipment. Operating wheeled or tracked vehicles is hazardous. Extreme care is needed when routes are chosen. Cable logging reduces the hazard of erosion and can eliminate the need for most skid trails and logging roads. The depth to bedrock results in a moderate hazard of windthrow in areas of the Ditney soil and a severe hazard of windthrow in areas of the Unicoi soil. Thinning should be held to a minimum, or the stand should not be thinned at all. A plan for the periodic removal of windthrown trees is advisable. The seedling mortality rate is moderate. Reinforcement planting may be necessary.

This map unit is unsuited to cultivated crops, pasture, hay, and urban uses because of the slope, the depth to bedrock, the Rock outcrop, and rock fragments on or near the surface.

The capability subclass is VIIe in areas of the Ditney and Unicoi soils and VIIIs in areas of the Rock outcrop. Based on chestnut oak as the indicator species, the woodland ordination symbol is 2R in areas of the Ditney and Unicoi soils. The Rock outcrop has not been assigned a woodland ordination symbol.

EcD—Edneyville-Chestnut complex, 10 to 25 percent slopes, stony. This map unit consists mainly of a very deep, well drained, moderately steep Edneyville soil and a moderately deep, well drained, moderately steep Chestnut soil. These soils are on mountain ridgetops. Rock fragments on the surface range from boulders to cobbles, average about 1 foot in diameter, and are about 25 to 80 feet apart. The unit is about 50 percent Edneyville soil and 40 percent Chestnut soil. The two soils occur as areas so intricately mixed that mapping them separately was not practical at the selected scale. Individual areas are long and narrow or irregular in shape and range from about 5 to 100 acres in size.

The Edneyville soil typically is on the smooth, wide parts of ridgetops. The Chestnut soil typically is on knobs and the narrow parts of ridgetops. These soils commonly are in the same landscape position.

Typically, the surface layer of the Edneyville soil is very dark grayish brown gravelly sandy loam 5 inches thick. The upper 5 inches of the subsoil is brownish yellow sandy loam. The lower 30 inches is yellowish brown sandy loam. The underlying material to a depth of 60 inches is multicolored saprolite that has a texture of sandy loam.

Permeability is moderately rapid in the Edneyville soil. Surface runoff is rapid in bare or unprotected areas. The shrink-swell potential is low in the subsoil. The depth to bedrock is more than 60 inches. The seasonal high water table is below a depth of 6 feet.

Typically, the surface layer of the Chestnut soil is brown gravelly sandy loam 5 inches thick. The subsoil is strong brown sandy loam 30 inches thick. Soft gneiss bedrock is at a depth of 35 to 60 inches.

Permeability is moderately rapid in the Chestnut soil. Surface runoff is rapid in bare or unprotected areas. The shrink-swell potential is low in the subsoil. The depth to soft bedrock is 20 to 40 inches. The depth to hard bedrock is more than 40 inches. The seasonal high water table is below a depth of 6 feet.

Included in this unit in mapping are small intermingled areas of Ashe, Porters, Evard, and Cowee soils. Ashe soils have hard bedrock within a depth of 40 inches. They are on knobs and the ends of ridges. Porters soils have a darker surface layer than that of the Chestnut and Edneyville soils and are at elevations above 3,600 feet. The finer textured Evard and Cowee soils are at the lower elevations. Also included are soils that have soft bedrock at a depth of 40 to 60 inches and scattered areas that are very stony or very

Figure 2.—Poor tree growth is common on Ditney-Unicoi-Rock outcrop complex, 60 to 95 percent slopes.

bouldery. Included soils make up about 10 percent of the map unit.

Most of the acreage in this map unit is used as woodland.

This map unit is moderately suited to trees. Overstory trees include northern red oak, white oak, scarlet oak, yellow-poplar, black locust, chestnut oak, hickory, sweet birch, pitch pine, Table Mountain pine, Virginia pine, and eastern white pine. Understory plants include mountain laurel, rhododendron, blueberry, sourwood, flowering dogwood, Fraser magnolia, blackgum, and galax.

The slope is the main limitation affecting woodland management. It increases the hazard of erosion and limits the use of equipment. Logging roads and skid trails should be laid out on the contour. Water bars break the flow of water along roads. In exposed areas applying lime and fertilizer and seeding help to control erosion. The depth to bedrock results in a moderate hazard of windthrow in areas of the Chestnut soil.

Thinning should be held to a minimum, or the stand should not be thinned at all. A plan for the periodic removal of windthrown trees is advisable.

This map unit is poorly suited to cultivated crops, pasture, and hay because of the slope and rock fragments on the surface. The slope results in a severe hazard of erosion. The rock fragments on the surface make cultivation impractical and mowing difficult. The depth to bedrock limits the thickness of the root zone and the amount of water available for plant growth in areas of the Chestnut soil.

This map unit is poorly suited to urban uses. The slope is the main limitation. The depth to bedrock also is a limitation in areas of the Chestnut soil. Areas used for building site development, such as for summer homes, should be carefully selected. Most areas that have a slope of more than 15 percent require substantial cutting and filling. The very deep Edneyville soils can be used for septic tank absorption fields if the fields are properly designed and installed. In exposed areas applying lime and fertilizer and seeding help to control erosion.

The capability subclass is VIe. Based on eastern white pine as the indicator species, the woodland ordination symbol is 12R in areas of the Edneyville soil. Based on chestnut oak as the indicator species, the woodland ordination symbol is 4R in areas of the Chestnut soil.

EcF—Edneyville-Chestnut complex, 25 to 80 percent slopes, stony. This map unit consists mainly of a very deep, well drained Edneyville soil and a moderately deep, well drained Chestnut soil. These soils are on ridgetops and mountain side slopes. They are steep and very steep. Rock fragments on the surface range from boulders to cobbles, average about 1 foot in diameter, and are about 25 to 80 feet apart. The unit is about 45 percent Edneyville soil and 35 percent Chestnut soil. The two soils occur as areas so intricately mixed that mapping them separately was not practical at the selected scale. Individual areas are irregular in shape and range from about 10 to 500 acres in size.

The Edneyville soil typically is on the smooth, lower parts of side slopes. The Chestnut soil typically is on ridgetops, shoulder slopes, and bluffs adjacent to streams. In many places both soils are in the same landscape position.

Typically, the surface layer of the Edneyville soil is very dark grayish brown gravelly sandy loam 5 inches thick. The upper 5 inches of the subsoil is brownish yellow sandy loam. The lower 30 inches is yellowish brown sandy loam. The underlying material to a depth of 60 inches is multicolored saprolite that has a texture of sandy loam.

Permeability is moderately rapid in the Edneyville soil. Surface runoff is rapid in bare or unprotected areas. The shrink-swell potential is low in the subsoil. The depth to bedrock is 60 inches or more. The seasonal high water table is below a depth of 6 feet.

Typically, the surface layer of the Chestnut soil is brown gravelly sandy loam 5 inches thick. The subsoil is strong brown sandy loam 30 inches thick. Soft gneiss bedrock is at a depth of 35 to 60 inches.

Permeability is moderately rapid in the Chestnut soil. Surface runoff is rapid in bare or unprotected areas. The shrink-swell potential is low in the subsoil. The depth to soft bedrock is 20 to 40 inches. The depth to hard bedrock is more than 40 inches. The seasonal high water table is below a depth of 6 feet.

Included in this unit in mapping are small areas of Ashe, Porters, Evard, Cowee, Greenlee, Cullasaja, and Tusquitee soils. Ashe soils have hard bedrock within a depth of 40 inches. They are on nose slopes and shoulder slopes. Porters soils have a darker surface layer than that of the Chestnut and Edneyville soils and are at elevations above 3,600 feet. The finer textured Evard and Cowee soils are at elevations below 3,000 feet. The colluvial Greenlee, Cullasaja, and Tusquitee soils are along drainageways, on benches, and on foot slopes. Also included are areas of soils that have soft bedrock at a depth of 40 to 60 inches, scattered areas that are very stony or very bouldery, and some areas of Rock outcrop on shoulder slopes. Included areas make up about 20 percent of the map unit.

Most of the acreage in this map unit is used as woodland.

This map unit is moderately suited to trees. Overstory trees include northern red oak, white oak, scarlet oak, yellow-poplar, black locust, chestnut oak, hickory, sweet birch, eastern hemlock, pitch pine, Table Mountain pine, Virginia pine, and eastern white pine. Understory plants include mountain laurel, rhododendron, blueberry, sourwood, Fraser magnolia, flowering dogwood, blackgum, and galax.

The slope is the main limitation affecting woodland management. It increases the hazard of erosion and limits the use of equipment. Extreme caution is needed when vehicles are operated on these soils. In most areas extensive grading is needed to establish roads and trails. Logging roads and skid trails should be laid out on the contour. Water bars break the flow of water along roads. Cable logging reduces the hazard of erosion and eliminates the need for most skid trails and logging roads. In exposed areas applying lime and fertilizer and seeding help to control erosion. The depth

to bedrock results in a moderate hazard of windthrow in areas of the Chestnut soil. Thinning should be held to a minimum, or the stand should not be thinned at all. A plan for the periodic removal of windthrown trees is advisable.

This map unit is unsuited to cultivated crops, pasture, hay, and most urban uses because of the slope, the hazard of erosion, and rock fragments on the surface. The depth to bedrock also is a limitation in areas of the Chestnut soil.

The capability subclass is VIIe. Based on eastern white pine as the indicator species, the woodland ordination symbol is 12R in areas of the Edneyville soil. Based on chestnut oak as the indicator species, the woodland ordination symbol is 4R in areas of the Chestnut soil.

EsB—Elsinboro loam, 1 to 4 percent slopes, rarely flooded. This map unit consists mainly of very deep, well drained, gently sloping Elsinboro and similar soils on low stream terraces along many of the larger streams. Most areas are somewhat elongated and range from about 4 to 50 acres in size.

Typically, the surface layer is dark yellowish brown loam 12 inches thick. The upper 6 inches of the subsoil is yellowish brown loam. The next 22 inches is strong brown clay loam. The lower 8 inches is yellowish brown loam. The underlying material extends to a depth of 60 inches. It is yellowish brown loam in the upper part and yellowish brown clay loam in the lower part.

Permeability is moderate. Surface runoff is medium in bare or unprotected areas. The shrink-swell potential is low in the subsoil. The depth to bedrock is more than 6 feet. The seasonal high water table is more than 5 feet below the surface. This soil is subject to rare flooding.

Included in this unit in mapping are small areas of Braddock, Dillard, Colvard, and Rosman soils. Braddock soils have a clayey subsoil. They are on high stream terraces. Dillard soils are moderately well drained. They are in depressions. Colvard and Rosman soils have coarser textured horizons beneath the surface layer than those of the Elsinboro soil. They are on flood plains adjacent to streams. Also included are a few scattered areas of soils that have a gravelly or cobbly surface layer. Included soils make up about 15 percent of the map unit.

Most of the acreage in this map unit is used as cropland, pasture, or hayland.

This map unit is well suited to woodland. Overstory trees include scarlet oak, white oak, red maple, yellow-poplar, American sycamore, eastern white pine, and Virginia pine. Understory plants include greenbrier, honeysuckle, blackberry, poison ivy, sourwood, American holly, flowering dogwood, and wild grape. No significant limitations affect woodland management.

This map unit is well suited to most of the field and truck crops and ornamental and horticultural crops commonly grown in the county. The rare flooding is a hazard.

This map unit is well suited to pasture and hay. No significant limitations affect these uses. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

This map unit is poorly suited to most urban uses. Flooding, wetness, and low strength in the subsoil are the main limitations. If this soil is used as a base for roads and streets, a mixture of sand and gravel and proper compaction are needed to increase strength and stability. A gravel base and an adequate wearing surface improve trafficability for year-round use.

The capability class is I. Based on yellow-poplar as the indicator species, the woodland ordination symbol is 6A.

EvD—Evard loam, 10 to 25 percent slopes. This map unit consists mainly of well drained, very deep, moderately steep Evard and similar soils on mountain ridgetops. Individual areas are long and narrow or irregular in shape and range from about 5 to 150 acres in size.

Typically, the surface layer is brown loam 5 inches thick. The upper 3 inches of the subsoil is yellowish red loam. The next 13 inches is yellowish red clay loam. The lower 13 inches is yellowish red loam. The underlying material to a depth of 60 inches is strong brown saprolite that has a texture of sandy loam. In some eroded areas the surface layer is clay loam.

Permeability is moderate. Surface runoff is rapid in bare or unprotected areas. The shrink-swell potential is low in the subsoil. The depth to bedrock is more than 60 inches. The seasonal high water table is below a depth of 6 feet.

Included in this unit in mapping are small intermingled areas of Hayesville and Cowee soils. Hayesville soils have a clayey subsoil. They are on the broad parts of ridgetops. Cowee soils have soft bedrock at a depth of 20 to 40 inches. They are on knobs and the ends of ridges. Also included are a few scattered areas of soils that have a high content of mica in the lower part of the profile and scattered areas of soils that have a very stony surface. Included soils make up about 25 percent of the map unit.

Most of the acreage in this map unit is used as woodland.

This map unit is moderately suited to trees. Overstory trees include white oak, scarlet oak, yellow-

poplar, black locust, chestnut oak, northern red oak, hickory, red maple, Virginia pine, blackgum, and eastern white pine. Understory plants include mountain laurel, blueberry, sourwood, flowering dogwood, Fraser magnolia, Christmas fern, and greenbrier.

The slope is the main limitation affecting woodland management. It increases the hazard of erosion and limits the use of equipment. Logging roads and skid trails should be laid out on the contour. Water bars break the flow of water along roads. In exposed areas applying lime and fertilizer and seeding help to control erosion.

This map unit is poorly suited to most cultivated crops. The slope is the main limitation. The hazard of erosion is severe.

This map unit is moderately suited to pasture and hay. The slope is the main limitation. Proper stocking rates, pasture rotation, and timely deferment of grazing during wet periods help to keep the pasture in good condition.

This map unit is poorly suited to most urban uses because of the slope and the hazard of erosion. Areas used for building site development should be carefully selected. Most areas that have a slope of more than 15 percent require substantial cutting and filling. Areas that have a slope of less than 15 percent can be used for septic tank absorption fields if the fields are properly designed and installed.

The capability subclass is VIe. Based on yellow-poplar as the indicator species, the woodland ordination symbol is 7R.

EwE—Evard-Cowee complex, 25 to 60 percent slopes. This map unit consists mainly of a very deep, well drained, steep Evard soil and a moderately deep, well drained, steep Cowee soil. These soils are on mountain side slopes. The unit is about 70 percent Evard soil and 15 percent Cowee soil. The two soils occur as areas so intricately mixed that mapping them separately was not practical at the selected scale. Individual areas are irregular in shape and range from about 10 to 800 acres in size.

The Evard soil typically is on the smooth, lower parts of side slopes. The Cowee soil typically is on shoulder slopes and nose slopes. In many places both soils are in the same landscape position.

Typically, the surface layer of the Evard soil is brown loam 5 inches thick. The upper 3 inches of the subsoil is yellowish red loam. The next 13 inches is red clay loam. The lower 13 inches is yellowish red loam. The underlying material to a depth of 60 inches is strong brown saprolite that has a texture of sandy loam. In places the surface layer is gravelly.

Permeability is moderate in the Evard soil. Surface runoff is rapid in bare or unprotected areas. The shrink-swell potential is low in the subsoil. The depth to bedrock is more than 60 inches. The seasonal high water table is below a depth of 6 feet.

Typically, the surface layer of the Cowee soil is brown loam 5 inches thick. The subsoil is 21 inches thick. It is strong brown loam in the upper part and yellowish red loam in the lower part. Soft bedrock is at a depth of 26 to 60 inches. In places the surface layer is gravelly.

Permeability is moderate in the Cowee soil. Surface runoff is rapid in bare or unprotected areas. The shrink-swell potential is low in the subsoil. The depth to soft bedrock is 20 to 40 inches. The depth to hard bedrock is more than 40 inches. The seasonal high water table is below a depth of 6 feet.

Included in this unit in mapping are small intermingled areas of Tate soils. These soils formed in colluvium. They are along drainageways and on benches. Also included are a few scattered areas of soils that have a high content of mica in the lower part of the profile and scattered areas of soils that have a very stony surface. Included soils make up about 15 percent of the map unit.

Most of the acreage in this map unit is used as woodland.

This map unit is moderately suited to trees. Overstory trees include white oak, scarlet oak, yellow-poplar, black locust, chestnut oak, northern red oak, hickory, red maple, Virginia pine, blackgum, pitch pine, and eastern white pine. Understory plants include mountain laurel, blueberry, sourwood, flowering dogwood, Fraser magnolia, Christmas fern, and greenbrier.

The slope is the main limitation affecting woodland management. It increases the hazard of erosion and limits the use of equipment. Extreme caution is needed when vehicles are operated on these soils. In most areas extensive grading is needed to establish roads and trails. Logging roads and skid trails should be laid out on the contour. Water bars break the flow of water along roads.

Cable logging reduces the hazard of erosion and can eliminate the need for most skid trails and logging roads. In exposed areas applying lime and fertilizer and seeding help to control erosion. The depth to bedrock results in a moderate hazard of windthrow in areas of the Cowee soil. In these areas, thinning should be held to a minimum or the stand should not be thinned at all. A plan for the periodic removal of windthrown trees is advisable.

This map unit is unsuited to most cultivated crops and to pasture and hay. The slope is the main limitation.

This map unit is unsuited to most urban uses because of the slope and the hazard of erosion. Also, the depth to bedrock is a limitation in areas of the Cowee soil.

The capability subclass is VIIe. Based on yellow-poplar as the indicator species, the woodland ordination symbol is 7R in areas of the Evard soil. Based on chestnut oak as the indicator species, the woodland ordination symbol is 3R in areas of the Cowee soil.

GrD—Greenlee very cobbly loam, 6 to 25 percent slopes, very bouldery. This map unit consists mainly of very deep, well drained, strongly sloping and moderately steep Greenlee and similar soils in mountain coves and on foot slopes, benches, and colluvial fans. Rock fragments on the surface range from boulders to cobbles, average about 30 inches in diameter, and are about 5 to 20 feet apart. Most areas are long and narrow or irregular in shape and range from about 4 to 100 acres in size.

Typically, the surface layer is black very cobbly loam 3 inches thick. The upper 5 inches of the subsoil is dark brown very cobbly sandy loam. The next 18 inches is dark yellowish brown very cobbly sandy loam. The lower 44 inches is yellowish brown very cobbly loamy sand. The underlying material extends to a depth of 80 inches. It is strong brown very cobbly loamy sand.

Permeability is moderately rapid. Surface runoff is rapid in bare or unprotected areas. The shrink-swell potential is low in the subsoil. The depth to bedrock is more than 5 feet. The seasonal high water table is below a depth of 6 feet.

Included in this unit in mapping are small intermingled areas of Tate, Maymead, Cullasaja, Tusquitee, and Potomac soils. Tate soils have a subsoil that is finer textured than that of the Greenlee soil, and they have fewer rock fragments throughout. Maymead soils also have fewer rock fragments throughout than the Greenlee soil. Cullasaja soils have a dark surface layer that is more than 10 inches thick. Tusquitee soils have a dark surface layer that is more than 7 inches thick and have fewer rock fragments throughout than the Greenlee soil. Potomac soils are coarser textured than the Greenlee soil and are on flood plains. Included soils make up about 25 percent of the map unit.

Most of the acreage in this map unit is used as woodland.

This map unit is moderately suited to woodland. Overstory trees include yellow-poplar, eastern hemlock, white oak, sweet birch, northern red oak, scarlet oak, red maple, black locust, eastern white pine, and Virginia pine. Understory plants include rhododendron, mountain laurel, Fraser magnolia, dog hobble, New York fern, Christmas fern, galax, white snakeroot, greenbrier, honeysuckle, blackberry, poison ivy, sourwood, American holly, flowering dogwood, and wild grape.

The slope and rock fragments on the surface are the main limitations affecting woodland management. The slope increases the hazard of erosion and limits the use of equipment. Wheeled tractors and vehicles that have high ground clearance can be operated only over carefully chosen routes. Logging roads and skid trails should be laid out on the contour. Water bars break the flow of water along roads. In exposed areas applying lime and fertilizer and seeding help to control erosion.

This map unit is unsuited to most of the field and truck crops commonly grown in the county. The slope and rock fragments on the surface are the main limitations. The slope results in a severe hazard of erosion. The rock fragments make conventional tillage impractical.

This map unit is unsuited to pasture and hay. The slope and rock fragments on the surface are the main limitations. The rock fragments hinder mowing. Vehicles must be operated over carefully chosen routes.

This map unit is poorly suited to most urban uses. The slope and rock fragments throughout the soil are the main limitations.

The capability subclass is VIIs. Based on yellow-poplar as the indicator species, the woodland ordination symbol is 8R.

HaC—Hayesville loam, 6 to 15 percent slopes. This map unit consists mainly of very deep, well drained, strongly sloping Hayesville and similar soils on intermountain foothills and ridgetops. Most areas are somewhat elongated or irregular in shape and range from about 4 to 200 acres in size.

Typically, the surface layer is brown loam 6 inches thick. The subsoil is 42 inches thick. The upper 18 inches of the subsoil is red clay. The next 12 inches is red clay loam. The lower 12 inches is red clay loam that has yellowish red and yellowish brown pockets of saprolite. The underlying material to a depth of 60 inches is red saprolite that has a texture of loam and has yellowish red, brownish yellow, and white streaks.

Permeability is moderate in the subsoil and moderately rapid in the substratum. Surface runoff is medium or rapid in bare or unprotected areas. The shrink-swell potential is low in the subsoil. The depth to bedrock is more than 60 inches. The seasonal high water table is below a depth of 6 feet.

Included in this unit in mapping are small areas of Evard and Braddock soils. Evard soils have a loamy subsoil. They are on knobs and the more sloping parts of the landscape. Braddock soils formed in old alluvium. They are on high stream terraces along the edge of some mapped areas. Also included are eroded areas

that have a surface layer of clay loam and some scattered areas of soils that have stones on the surface. Included soils make up about 15 percent of the map unit.

This map unit is used mostly for woodland.

This map unit is moderately suited to woodland. Overstory trees include scarlet oak, chestnut oak, white oak, red maple, eastern white pine, yellow-poplar, Virginia pine, pitch pine, and hickory. Understory plants include greenbrier, honeysuckle, blackberry, poison ivy, sourwood, American holly, flowering dogwood, sassafras, mountain laurel, and wild grape.

Depth to the clayey subsoil is the main limitation affecting woodland use. It limits the use of equipment. Logging equipment should be operated only during dry periods.

This map unit is moderately suited to most of the field and truck crops commonly grown in the county. The slope and the hazard of erosion are management concerns. Conservation tillage, contour farming, stripcropping, cover crops, crop residue management, grassed waterways, and field borders improve tilth, conserve moisture, help to control erosion, and minimize the offsite damage caused by sedimentation.

This map unit is well suited to pasture and hay. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

This map unit is moderately suited to most urban uses. The slope, a high content of clay, the moderate permeability, and low strength in the subsoil are the main limitations. Extensive cutting and filling and detailed site planning are required. The moderate permeability in the clayey part of the subsoil can be overcome by increasing the size of the absorption area in septic tank absorption fields. If this soil is used as a base for roads and streets, a mixture of sand and gravel and proper compaction are needed to increase strength and stability. A gravel base and an adequate wearing surface improve trafficability for year-round use.

The capability subclass is IVe. Based on yellow-poplar as the indicator species, the woodland ordination symbol is 7C.

HcC2—Hayesville clay loam, 6 to 15 percent slopes, eroded. This map unit consists mainly of very deep, well drained, strongly sloping Hayesville and similar soils on ridgetops in intermountain areas and foothills. Most areas are somewhat elongated or irregular in shape and range from about 4 to 200 acres in size.

Typically, the surface layer is reddish brown clay loam 6 inches thick. The subsoil is 42 inches thick. The upper 18 inches of the subsoil is red clay. The next 12 inches is red clay loam. The lower 12 inches is red clay loam that has yellowish red and yellowish brown pockets of saprolite. The underlying material to a depth of 60 inches is red saprolite that has a texture of loam and has yellowish red, brownish yellow, and white streaks.

Permeability is moderate in the subsoil and moderately rapid in the substratum. Surface runoff is medium or rapid in bare or unprotected areas. The shrink-swell potential is low in the subsoil. The depth to bedrock is more than 60 inches. The seasonal high water table is below a depth of 6 feet.

Included in this unit in mapping are small areas of Evard and Braddock soils. Evard soils have a loamy subsoil. They are on knobs and the more sloping parts of the landscape. Braddock soils formed in old alluvium. They are on high stream terraces along the edge of some mapped areas. Also included are some scattered areas of soils that have stones on the surface. Included soils make up about 15 percent of the map unit.

Most of the acreage in this map unit is used as woodland, pasture, or hayland.

This map unit is moderately suited to woodland. Virginia pine and pitch pine are the dominant overstory trees in areas where old fields have reverted to woodland. Other overstory trees include scarlet oak, chestnut oak, white oak, red maple, eastern white pine, yellow-poplar, and hickory. Understory plants include greenbrier, honeysuckle, blackberry, poison ivy, sourwood, American holly, flowering dogwood, sassafras, mountain laurel, and wild grape.

Depth to the clayey subsoil and the texture of the surface layer are the main limitations affecting woodland use. The depth to the clayey subsoil limits the use of equipment. Logging equipment should be operated only during dry periods. The clay loam in the surface layer increases the seedling mortality rate. Reinforcement planting may be necessary.

This map unit is moderately suited to most of the field and truck crops commonly grown in the county. The texture of the topsoil, the hazard of erosion, and the slope are management concerns. If the soil is tilled when too wet, clods form and seed germination may not be uniform across the field. Conservation tillage, contour farming, stripcropping, cover crops, crop residue management, grassed waterways, and field borders improve tilth, conserve moisture, help to control erosion, and minimize the offsite damage caused by sedimentation.

This map unit is moderately suited to pasture and hay. Depth to the clayey subsoil and the texture of the surface layer can limit the establishment of sod. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to

keep the pasture in good condition.

This map unit is moderately suited to most urban uses. The slope, a high content of clay, the moderate permeability, and low strength in the subsoil are the main limitations. Extensive cutting and filling and detailed site planning are required. The moderate permeability in the clayey part of the subsoil can be overcome by increasing the size of the absorption area in septic tank absorption fields. If this soil is used as a base for roads and streets, a mixture of sand and gravel and proper compaction are needed to increase strength and stability. A gravel base and an adequate wearing surface improve trafficability for year-round use.

The capability subclass is VIe. Based on yellow-poplar as the indicator species, the woodland ordination symbol is 6C.

HeD—Hayesville-Evard complex, 15 to 25 percent slopes. This map unit consists mainly of very deep, well drained, moderately steep Hayesville and Evard soils in intermountain areas and on side slopes of foothills. The unit is about 45 percent Hayesville soil and 40 percent Evard soil. The two soils occur as areas so intricately mixed that mapping them separately was not practical at the selected scale. Individual areas are somewhat elongated or irregular in shape and range from about 4 to 200 acres in size.

The Hayesville soil typically is on long, smooth parts of side slopes. The Evard soil typically is on short, convex side slopes. In places both soils are in the same landscape position.

Typically, the surface layer of the Hayesville soil is brown loam 6 inches thick. The subsoil is 42 inches thick. The upper 18 inches of the subsoil is red clay. The next 12 inches is red clay loam. The lower 12 inches is red clay loam that has yellowish red and yellowish brown pockets of saprolite. The underlying material to a depth of 60 inches is red saprolite that has a texture of loam and has yellowish red, brownish yellow, and white streaks.

Permeability is moderate in the subsoil of the Hayesville soil and moderately rapid in the substratum. Surface runoff is rapid in bare or unprotected areas. The shrink-swell potential is low in the subsoil. The depth to bedrock is more than 60 inches. The seasonal high water table is below a depth of 6 feet.

Typically, the surface layer of the Evard soil is brown loam 5 inches thick. The upper 3 inches of the subsoil is yellowish red loam. The next 13 inches is red clay loam. The lower 13 inches is yellowish red loam. The underlying material to a depth of 60 inches is strong brown saprolite that has a texture of sandy loam. In some eroded areas the surface layer is clay loam.

Permeability is moderate in the Evard soil. Surface runoff is rapid in bare or unprotected areas. The shrink-swell potential is low in the subsoil. The depth to bedrock is more than 60 inches. The seasonal high water table is below a depth of 6 feet.

Included in this unit in mapping are small areas of Cowee, Tate, Iotla, and Brasstown soils. Cowee soils are intermingled with areas of the Hayesville and Evard soils and have soft bedrock at a depth of 20 to 40 inches. Tate soils formed in colluvium and are on foot slopes. Iotla soils formed in alluvium, are somewhat poorly drained, and are on flood plains that are too narrow to map at the selected scale. Brasstown soils formed in material weathered from phyllite or quartzite, have soft bedrock at a depth of 40 to 60 inches, and are intermingled with areas of the Hayesville and Evard soils. Also included are a few scattered areas of soils that have a high content of mica in the lower part of the profile or that have a stony surface. Included areas make up about 15 percent of the map unit.

Most of the acreage in this map unit is used as woodland.

This map unit is moderately suited to trees. Overstory trees include white oak, scarlet oak, yellow-poplar, black locust, chestnut oak, pitch pine, hickory, red maple, Virginia pine, blackgum, and eastern white pine. Understory plants include mountain laurel, blueberry, sourwood, flowering dogwood, Fraser magnolia, Christmas fern, rhododendron, and greenbrier.

The slope is the main limitation affecting woodland management. It increases the hazard of erosion and limits the use of equipment. Logging roads and skid trails should be laid out on the contour. Water bars break the flow of water along roads. In exposed areas applying lime and fertilizer and seeding help to control erosion. Depth to the clayey subsoil limits the use of equipment in areas of the Hayesville soil. Logging equipment should be operated only during dry periods.

This map unit is poorly suited to most cultivated crops. The slope is the main limitation. The hazard of erosion is severe.

This map unit is moderately suited to pasture and hay. The slope is the main limitation. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

This map unit is poorly suited to most urban uses because of the slope and the hazard of erosion. Areas used for building site development should be carefully selected. Most areas require substantial cutting and filling. Management practices are needed in unvegetated areas to help to control erosion and sedimentation.

The capability subclass is VIe. Based on yellow-

poplar as the indicator species, the woodland ordination symbol is 7R.

HrD—Hayesville-Evard-Urban land complex, 15 to 25 percent slopes. This map unit occurs mainly as areas of very deep, well drained, moderately steep Hayesville and Evard soils and areas of Urban land. This unit is on side slopes in intermountain areas and on foothills. The mapped areas are primarily in and around small towns, communities, and housing developments. The unit is about 35 percent Hayesville soil, 30 percent Evard soil, and 20 percent Urban land. The Urban land and Hayesville and Evard soils occurs as areas so intricately mixed that mapping them separately was not practical at the selected scale. Individual areas are somewhat elongated or irregular in shape and range from about 10 to 60 acres in size.

The Hayesville and Evard soils consist of undisturbed areas between buildings, roads, streets, and parking lots.

Typically, the surface layer of the Hayesville soil is brown loam 6 inches thick. The subsoil is 42 inches thick. The upper 18 inches of the subsoil is red clay. The next 12 inches is red clay loam. The lower 12 inches is red clay loam that has yellowish red and yellowish brown pockets of saprolite. The underlying material to a depth of 60 inches is red saprolite that has a texture of loam and has yellowish red, brownish yellow, and white streaks.

Permeability is moderate in the subsoil of the Hayesville soil and moderately rapid in the substratum. Surface runoff is rapid in bare or unprotected areas. The shrink-swell potential is low in the subsoil. The depth to bedrock is more than 60 inches. The seasonal high water table is below a depth of 6 feet.

Typically, the surface layer of the Evard soil is brown loam 5 inches thick. The upper 3 inches of the subsoil is yellowish red loam. The next 13 inches is red clay loam. The lower 13 inches is yellowish red loam. The underlying material to a depth of 60 inches is strong brown saprolite that has a texture of sandy loam. In some eroded areas the surface layer is clay loam.

Permeability is moderate in the Evard soil. Surface runoff is rapid in bare or unprotected areas. The shrink-swell potential is low in the subsoil. The depth to bedrock is more than 60 inches. The seasonal high water table is below a depth of 6 feet.

Urban land consists of areas where the soils are largely covered by concrete, asphalt, buildings, or other impervious surfaces.

Included in this map unit are small areas of Udorthents and Cowee, Tate, and Iotla soils. Udorthents consist of cut and fill areas. They are adjacent to the impervious surfaces. Cowee soils are intermingled with areas of the Hayesville and Evard soils and Urban land and have soft bedrock at a depth of 20 to 40 inches. Tate soils formed in colluvium and are on foot slopes. Iotla soils formed in alluvium, are somewhat poorly drained, and are on flood plains that are too narrow to map at the selected scale. Also included are a few areas that have a high content of mica in the lower part of the subsoil. Included soils make up about 15 percent of the map unit.

Most of the acreage of the soils in this map unit is used for yards, gardens, recreational areas, or landscaping in and around the Urban land. These open areas make up management units that range in size from about 500 to 7,000 square feet. These areas are too small to be used as commercial woodland, cropland, pasture, or hayland.

This map unit is poorly suited to most urban uses because of the slope and the hazard of erosion. Areas used for building site development should be carefully selected. Most areas require substantial cutting and filling. Management practices are needed in unvegetated areas to help to control erosion and sedimentation. Undisturbed areas of the Hayesville and Evard soils are suited to lawn grasses, shade trees, ornamental trees, and vines. Some areas that have been cut, filled, or compacted are poorly suited. Because the open areas are small, onsite investigation is needed before use and management of the areas can be planned.

The capability subclass is VIe in areas of the Hayesville and Evard soils and VIIIs in areas of the Urban land. This map unit has not been assigned a woodland ordination symbol.

HuC—Hayesville-Urban land complex, 6 to 15 percent slopes. This map unit occurs mainly as areas of a very deep, well drained, strongly sloping Hayesville soil and areas of Urban land. The unit is on ridgetops and side slopes in intermountain areas and foothills. The mapped areas are primarily in and around small towns, communities, and housing developments. The unit is about 50 percent Hayesville soil and 30 percent Urban land. The Urban land and Hayesville soil occur as areas so intricately mixed that mapping them separately was not practical at the selected scale. Individual areas are generally rectangular or irregular in shape and range from about 10 to 60 acres in size.

The Hayesville soil consists of undisturbed areas between buildings, roads, streets, and parking lots.

Typically, the surface layer of the Hayesville soil is brown loam 6 inches thick. The upper 18 inches of the subsoil is red clay. The next 12 inches is red clay loam.

The lower 12 inches is red clay loam that has yellowish red and yellowish brown pockets of saprolite. The underlying material to a depth of 60 inches is red saprolite that has a texture of loam and has yellowish red, brownish yellow, and white streaks.

Permeability is moderate in the subsoil of the Hayesville soil and moderately rapid in the substratum. Surface runoff is medium or rapid in bare or unprotected areas. The shrink-swell potential is low in the subsoil. The depth to bedrock is more than 60 inches. The seasonal high water table is below a depth of 6 feet.

Urban land consists of areas where the soils are largely covered by concrete, asphalt, buildings, or other impervious surfaces.

Included in this unit in mapping are small areas of Udorthents and Evard soils. Udorthents consist of cut and fill areas. They are adjacent to the impervious surfaces. Evard soils have a loamy subsoil and are in scattered areas throughout the unit. Also included are some eroded areas of a Hayesville soil that has a surface layer of clay loam. Included soils make up about 20 percent of this map unit.

Most of the acreage of the soils in this map unit is used for yards, gardens, recreational areas, or landscaping in and around the Urban land. These open areas make up management units that range in size from about 500 to 7,000 square feet. These areas are too small to be used as commercial woodland, cropland, pasture, or hayland.

This map unit is moderately suited to most urban uses. The slope, a high content of clay, the moderate permeability, and low strength in the subsoil are the main limitations. Extensive cutting and filling and detailed site planning are required. The moderate permeability in the predominantly clayey subsoil of the Hayesville soil can be overcome by increasing the size of the absorption area in septic tank absorption fields. If the Hayesville soil is used as a base for roads and streets, a mixture of sand and gravel and proper compaction are needed to increase strength and stability. A gravel base and an adequate wearing surface improve trafficability for year-round use.

This map unit generally is moderately suited to lawn grasses, shade trees, ornamental trees, shrubs, vines, and garden vegetables. Some areas that have been cut, filled, or compacted, however, are poorly suited. Because the open areas are small, onsite investigation is needed before use and management of the areas can be planned.

The capability subclass is IVe in areas of the Hayesville soil and VIIIs in areas of the Urban land. This map unit has not been assigned a woodland ordination symbol.

IoA—Iotla sandy loam, 0 to 2 percent slopes, occasionally flooded. This map unit consists mainly of very deep, somewhat poorly drained, nearly level Iotla and similar soils on flood plains adjacent to streams throughout the county. Most areas are long and narrow and range from about 4 to 150 acres in size.

Typically, the surface layer is dark yellowish brown sandy loam 12 inches thick. The underlying material extends to a depth of more than 60 inches. In sequence downward, it is 9 inches of dark yellowish brown loam that has dark grayish brown mottles; 5 inches of dark grayish brown fine sandy loam that has yellowish brown and dark gray mottles; 4 inches of mottled light brownish gray, dark gray, and yellowish brown sand; 20 inches of very dark gray loam; and 10 inches of light brownish gray gravelly sand.

Permeability is moderately rapid or rapid in the underlying material. Surface runoff is slow. The shrink-swell potential is low in the underlying material. The depth to bedrock is more than 5 feet. The seasonal high water table is 1.5 to 3.5 feet below the surface. This soil is occasionally flooded for brief periods (fig. 3).

Included in this unit in mapping are small areas of Colvard, Rosman, Biltmore, Dillard, and Potomac soils. The well drained Colvard, Rosman, and Biltmore soils are adjacent to deep stream channels and large streams. The moderately well drained Dillard soils are on low terraces. Potomac soils have more than 35 percent rock fragments throughout. They are on the higher parts of some mapped areas where stream velocity is high. Also included are poorly drained soils in depressions and along spring fed drainageways. Included soils make up about 20 percent of the map unit.

Most of the acreage in this map unit is used as pasture or hayland.

This map unit is well suited to trees. Overstory trees include American sycamore, green ash, red maple, yellow-poplar, river birch, and black willow. Understory plants include alder, American hornbeam, black cherry, greenbrier, honeysuckle, blackberry, giant cane, poison ivy, and wild grape.

No significant limitations affect woodland management. Wetness, however, limits the use of planting and harvesting equipment. Logging equipment should be operated only during dry periods.

This map unit is moderately suited to most of the field and truck crops commonly grown in the county. Wetness can be a limitation. A surface and subsurface drainage system is needed to obtain maximum yields in some areas. Some areas of this soil in the Muddy Creek watershed are protected from flooding. Returning crop residue to the soil and planting winter cover crops increase the content of organic matter and thus improve

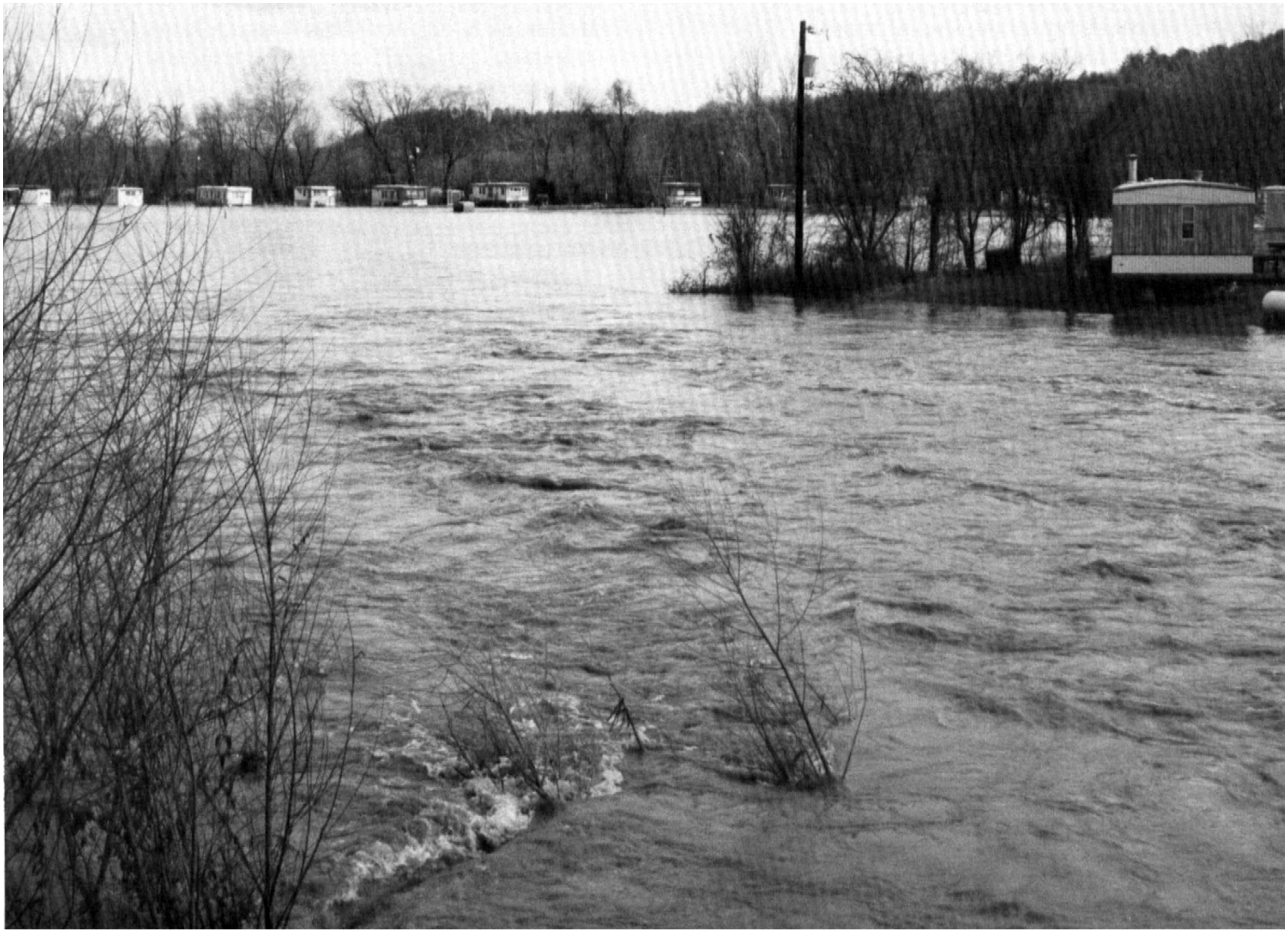

Figure 3.—Flooding in an area of Iotla sandy loam, 0 to 2 percent slopes, occasionally flooded.

fertility, the available water capacity, and tilth.

This map unit is moderately suited to pasture and hay. Wetness is the main limitation. A surface and subsurface drainage system is needed to improve productivity in some areas. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

This map unit is poorly suited to most urban uses. The occasional flooding and wetness are severe limitations.

The capability subclass is IIw. Based on yellow-poplar as the indicator species, the woodland ordination symbol is 8A.

JbD—Junaluska-Brasstown complex, 6 to 25 percent slopes. This map unit consists mainly of a well drained, moderately deep Junaluska soil and a well drained, deep Brasstown soil. These soils are on low mountain ridgetops. They are strongly sloping and moderately steep. The unit is about 45 percent Junaluska soil and 30 percent Brasstown soil. The two soils occur as areas so intricately mixed that mapping them separately was not practical at the selected scale. Individual areas are long and narrow or irregular in shape and range from about 5 to 100 acres in size.

The Junaluska soil typically is on knobs and the narrow parts of ridgetops. The Brasstown soil typically is on the smooth, wide parts of ridgetops. In many

places both soils are in the same landscape position.

Typically, the surface layer of the Junaluska soil is brown channery fine sandy loam 4 inches thick (fig. 4). The subsoil is 24 inches thick. The upper 5 inches of the subsoil is strong brown loam. The next 9 inches is strong brown clay loam. The lower 10 inches is yellowish brown fine sandy loam that has very pale brown mottles. Soft, weathered, interbedded quartzite and phyllite bedrock is at a depth of 28 to 60 inches.

Permeability is moderate in the subsoil of the Junaluska soil. Surface runoff is rapid in bare or unprotected areas. The shrink-swell potential is low in the subsoil. The depth to soft bedrock is 20 to 40 inches. The depth to hard bedrock is more than 40 inches. The seasonal high water table is below a depth of 6 feet.

Figure 4.—An area of the Junaluska-Brasstown complex, 6 to 25 percent slopes. The surface layer is channery fine sandy loam that has numerous thin, flat fragments of quartzite and phyllite rocks called channers.

Typically, the surface layer of the Brasstown soil is yellowish brown channery fine sandy loam 2 inches thick. The subsurface layer is yellowish brown channery fine sandy loam 4 inches thick. In sequence downward, the subsoil is 3 inches of strong brown loam, 10 inches of yellowish red loam, 11 inches of red clay loam, and 11 inches of yellowish red very fine sandy loam. The underlying material extends to a depth of 50 inches. It is multicolored saprolite that has a texture of very fine sandy loam. Soft, weathered phyllite bedrock is at a depth of 50 to 60 inches.

Permeability is moderate in the Brasstown soil. Surface runoff is rapid in bare or unprotected areas. The shrink-swell potential is low in the subsoil. The depth to soft bedrock is 40 to 60 inches. The depth to hard bedrock is more than 60 inches. The seasonal high water table is below a depth of 6 feet.

Included in this unit in mapping are small intermingled areas of Ditney and Soco soils. These soils are coarser textured than the Junaluska and Brasstown soils and have more stones on the surface. They are on the narrow parts of ridgetops and knobs. Also included are a few small areas that have boulders on the surface. Included areas make up about 25 percent of the map unit.

Most of the acreage in this map unit supports hardwoods and pine.

This map unit is moderately suited to trees. Overstory trees include chestnut oak, scarlet oak, pitch pine, Table Mountain pine, red maple, eastern white pine, and Virginia pine. Understory plants include mountain laurel, blueberry, blackgum, sourwood, greenbrier, azalea, and galax. The quality of the woodland is relatively low because of low natural fertility, low precipitation, forest fires, and other factors.

The slope is the main limitation affecting woodland management. It increases the hazard of erosion and limits the use of equipment. Logging roads and skid trails should be laid out on the contour. Water bars break the flow of water along roads. In exposed areas applying lime and fertilizer and seeding help to control erosion. The depth to bedrock results in a moderate hazard of windthrow in areas of the Junaluska soil. In these areas, thinning should be held to a minimum or the stand should not be thinned at all. A plan for the periodic removal of windthrown trees is advisable.

This map unit is poorly suited to most cultivated crops. The slope is the main limitation. The hazard of erosion is severe.

This map unit is moderately suited to pasture and hay. The slope is the main limitation. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

This map unit is poorly suited to most urban uses because of the slope and the hazard of erosion. Also, the depth to bedrock is a limitation in areas of the Junaluska soil. Areas used for building site development should be carefully selected. Most areas that have a slope of more than 15 percent require substantial cutting and filling. Areas of the Brasstown soil that have a slope of less than 15 percent can be used for septic tank absorption fields if the fields are properly designed and installed.

The capability subclass is VIe. Based on shortleaf pine as the indicator species, the woodland ordination symbol is 7R in areas of the Junaluska soil. Based on scarlet oak as the indicator species, the woodland ordination symbol is 4R in areas of the Brasstown soil.

JbE—Junaluska-Brasstown complex, 25 to 60 percent slopes. This map unit consists mainly of a well drained, moderately deep, steep Junaluska soil and a well drained, deep, steep Brasstown soil. These soils are on low mountain side slopes. The unit is about 45 percent Junaluska soil and 30 percent Brasstown soil. The two soils occur as areas so intricately mixed that mapping them separately was not practical at the selected scale. Individual areas are irregular in shape and range from about 5 to 300 acres in size.

The Junaluska soil typically is on shoulder slopes and nose slopes. The Brasstown soil typically is on the smooth, lower parts of side slopes. In many places both soils are in the same landscape position.

Typically, the surface layer of the Junaluska soil is brown channery fine sandy loam 4 inches thick. The upper 5 inches of the subsoil is strong brown loam. The next 9 inches is strong brown clay loam. The lower 10 inches is yellowish brown fine sandy loam that has very pale brown mottles. Soft, weathered, interbedded quartzite and phyllite bedrock is at a depth of 28 to 60 inches.

Permeability is moderate in the subsoil of the Junaluska soil. Surface runoff is rapid in bare or unprotected areas. The shrink-swell potential is low in the subsoil. The depth to soft bedrock is 20 to 40 inches. The depth to hard bedrock is more than 40 inches. The seasonal high water table is below a depth of 6 feet.

Typically, the surface layer of the Brasstown soil is yellowish brown channery fine sandy loam 2 inches thick. The subsurface layer is yellowish brown channery fine sandy loam 4 inches thick. In sequence downward, the subsoil is 3 inches of strong brown loam, 10 inches of yellowish red loam, 11 inches of red clay loam, and 11 inches of yellowish red very fine sandy loam. The underlying material extends to a depth of 50 inches. It is multicolored saprolite that has a texture of very fine

sandy loam. Soft, weathered phyllite bedrock is at a depth of 50 to 60 inches.

Permeability is moderate in the Brasstown soil. Surface runoff is rapid in bare or unprotected areas. The shrink-swell potential is low in the subsoil. The depth to soft bedrock is 40 to 60 inches. The depth to hard bedrock is more than 60 inches. The seasonal high water table is below a depth of 6 feet.

Included in this unit in mapping are small intermingled areas of Ditney, Soco, Lonon, and Northcove soils. Ditney and Soco soils are coarser textured than the Junaluska and Brasstown soils and are on shoulder slopes and nose slopes. Lonon soils are very deep, formed in colluvium, and are along drainageways on foot slopes. Northcove soils are very deep, formed in colluvium, have more than 35 percent rock fragments throughout, and are along drainageways on foot slopes. Also included are a few small areas that have boulders on the surface. Included areas make up about 25 percent of the map unit.

Most of the acreage in this map unit supports hardwoods and pine.

This map unit is moderately suited to trees. Overstory trees include chestnut oak, scarlet oak, pitch pine, Table Mountain pine, red maple, eastern white pine, and Virginia pine. Understory plants include mountain laurel, blueberry, blackgum, sourwood, greenbrier, azalea, and galax. The quality of the woodland is relatively low because of low natural fertility, low precipitation, forest fires, and other factors.

The slope is the main limitation affecting woodland management. It increases the hazard of erosion and limits the use of equipment. Extreme caution is needed when vehicles are operated on these soils. In most areas extensive grading is needed to establish roads and trails. Logging roads and skid trails should be laid out on the contour. Water bars break the flow of water along roads. Cable logging reduces the hazard of erosion and eliminates the need for most skid trails and logging roads. In exposed areas applying lime and fertilizer and seeding help to control erosion. The depth to bedrock results in a moderate hazard of windthrow in areas of the Junaluska soil. In these areas, thinning should be held to a minimum or the stand should not be thinned at all. A plan for the periodic removal of windthrown trees is advisable.

This map unit is unsuited to most cultivated crops. The slope is the main limitation. The hazard of erosion is severe.

This map unit is unsuited to pasture and hay. The slope is the main limitation.

This map unit is unsuited to most urban uses because of the slope and the hazard of erosion. Also, the depth to bedrock is a limitation in areas of the Junaluska soil.

The capability subclass is VIIe. Based on shortleaf pine as the indicator species, the woodland ordination symbol is 7R in areas of the Junaluska soil. Based on scarlet oak as the indicator species, the woodland ordination symbol is 4R in areas of the Brasstown soil.

LnC—Lonon-Northcove complex, 6 to 15 percent slopes. This map unit consists mainly of very deep, well drained, strongly sloping Lonon and Northcove soils on foot slopes and colluvial fans. Rock fragments on the surface of the Lonon soil range from boulders to cobbles, average about 1 foot in diameter, and are about 25 to 80 feet apart. Rock fragments on the surface of the Northcove soil range from boulders to cobbles, average about 18 inches in diameter, and are about 3 to 25 feet apart. The unit is about 65 percent Lonon soil and 20 percent Northcove soil. The two soils occur as areas so intricately mixed that mapping them separately was not practical at the selected scale. Most areas are long and narrow or irregular in shape and range from about 10 to 75 acres in size.

The Lonon soil is on side slopes and the more stable parts of the landscape between drainageways. The Northcove soil is on side slopes adjacent to intermittent streams.

Typically, the surface layer of the Lonon soil is dark brown fine sandy loam 3 inches thick. The subsurface layer is strong brown fine sandy loam 5 inches thick. The subsoil extends to a depth of 80 inches. In sequence downward, it is 4 inches of yellowish red loam, 23 inches of yellowish red clay loam, 8 inches of red cobbly clay loam, and 37 inches of red very cobbly clay loam.

Permeability is moderate in the Lonon soil. Surface runoff is medium or rapid in bare or unprotected areas. The shrink-swell potential is low in the subsoil. The depth to bedrock is more than 5 feet. The seasonal high water table is below a depth of 6 feet.

Typically, the surface layer of the Northcove soil is dark grayish brown very cobbly sandy loam 3 inches thick. The subsoil is 57 inches thick. The upper 3 inches of the subsoil is yellowish brown very cobbly sandy loam. The next 24 inches is light yellowish brown very cobbly sandy loam. The lower 30 inches is yellowish brown very cobbly loam. The underlying material extends to a depth of 80 inches. It is light yellowish brown very cobbly sandy loam.

Permeability is moderately rapid in the Northcove soil. Surface runoff is rapid in bare or unprotected areas. The shrink-swell potential is low in the subsoil. The depth to bedrock is more than 5 feet. The seasonal

high water table is below a depth of 6 feet.

Included in this unit in mapping are small areas of Junaluska, Brasstown, and Potomac soils. Junaluska and Brasstown soils formed in residuum and are on narrow remnants of ridges on some of the larger colluvial fans. Junaluska soils have soft bedrock at a depth of 20 to 40 inches. Brasstown soils have soft bedrock at a depth of 40 to 60 inches. Potomac soils are coarser textured than the Lonon and Northcove soils and are on flood plains. Included soils make up about 15 percent of the map unit.

Most of the acreage in this map unit is used as woodland.

This map unit is moderately suited to trees. Overstory trees include chestnut oak, scarlet oak, pitch pine, yellow-poplar, white oak, eastern white pine, and Virginia pine. Understory plants include rhododendron, mountain laurel, Fraser magnolia, dog hobble, Christmas fern, galax, white snakeroot, greenbrier, honeysuckle, blueberry, blackberry, poison ivy, sourwood, flowering dogwood, and wild grape. The quality of the woodland is relatively low because of low natural fertility, low precipitation, forest fires, and other factors.

No significant limitations affect woodland management in areas of the Lonon soil. Rock fragments on and below the surface are the main limitations affecting woodland management in areas of the Northcove soil. Wheeled tractors and vehicles that have high ground clearance can be operated only over carefully chosen routes in areas of the Northcove soil. The rock fragments in the Northcove soil reduce the amount of moisture available to plants and increase the seedling mortality rate. Reinforcement planting may be necessary on the Northcove soil.

This map unit generally is poorly suited to most of the field and truck crops commonly grown in the county. The slope and rock fragments on the surface are the main limitations. The slope results in a hazard of erosion. The rock fragments make conventional tillage impractical. Areas of the Lonon soil where the rock fragments have been removed from the surface are moderately suited to crop production. The content of rock fragments throughout the Northcove soil is so high that removing the stones and channers from the surface does not make cultivation practical.

This map unit generally is poorly suited to pasture and hay. Rock fragments on the surface are the main limitation. The rock fragments hinder mowing. Vehicles must be operated over carefully chosen routes. Areas where the rock fragments have been removed from the surface are moderately suited to pasture and hay.

This map unit is poorly suited to most urban uses. The slope is the main limitation affecting urban uses in areas of the Lonon soil. Management practices are needed in unvegetated areas of the Lonon soil to help to control erosion and offsite damage caused by sedimentation. The slope and rock fragments throughout the soil are the main limitations in areas of the Northcove soil.

The capability subclass is IVs in areas of the Lonon soil and VIIs in areas of the Northcove soil. Based on northern red oak as the indicator species, the woodland ordination symbol is 4A in areas of the Lonon soil. Based on yellow-poplar as the indicator species, the woodland ordination symbol is 5X in areas of the Northcove soil.

MaD—Maymead fine sandy loam, 10 to 25 percent slopes, stony. This map unit consists mainly of very deep, well drained, moderately steep Maymead and similar soils on foot slopes and benches in mountain coves. Rock fragments on the surface range from boulders to cobbles, average about 1 foot in diameter, and are about 25 to 80 feet apart. Most areas are long and narrow or irregular in shape and range from about 4 to 40 acres in size.

Typically, the surface layer is dark brown fine sandy loam 5 inches thick. The upper 3 inches of the subsoil is dark yellowish brown fine sandy loam. The next 10 inches is yellowish brown sandy loam. The lower 24 inches is yellowish brown gravelly sandy loam. The underlying material to a depth of 60 inches is yellowish brown cobbly sandy loam.

Permeability is moderately rapid. Surface runoff is rapid in bare or unprotected areas. The shrink-swell potential is low in the subsoil. The depth to bedrock is more than 60 inches. The seasonal high water table is below a depth of 6 feet.

Included in this unit in mapping are small intermingled areas of Greenlee, Tate, Potomac, Cullasaja, and Tusquitee soils. Greenlee, Potomac, and Cullasaja soils have more than 35 percent rock fragments throughout. Tate soils have a subsoil that is finer textured than that of the Maymead soil. Potomac soils have sandy underlying material and are on narrow flood plains. Tusquitee soils have a dark surface layer that is more than 7 inches thick. Included soils make up about 20 percent of the map unit.

Most of the acreage in this map unit is used as woodland.

This map unit is moderately suited to woodland. Overstory trees include yellow-poplar, eastern hemlock, white oak, sweet birch, northern red oak, red maple, black locust, eastern white pine, and Virginia pine. Understory plants include rhododendron, mountain

laurel, Fraser magnolia, dog hobble, New York fern, Christmas fern, galax, white snakeroot, greenbrier, honeysuckle, blackberry, poison ivy, sourwood, American holly, flowering dogwood, and wild grape.

The slope is the main limitation affecting woodland management. It increases the hazard of erosion and limits the use of equipment. Logging roads and skid trails should be laid out on the contour. Water bars break the flow of water along roads. In exposed areas applying lime and fertilizer and seeding help to control erosion.

This map unit is poorly suited to most of the field and truck crops commonly grown in the county. The slope, the hazard of erosion, and rock fragments on the surface are the main limitations.

This map unit generally is poorly suited to pasture and hay. Rock fragments on the surface hinder the establishment of sod and mowing. Areas where the rock fragments have been removed from the surface are moderately suited to pasture and hay. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

This map unit generally is poorly suited to most urban uses. The slope and rock fragments on the surface are the main limitations. Areas used for building site development should be carefully selected. Most areas require substantial cutting and filling. Management practices are needed in unvegetated areas to help to control erosion and offsite damage caused by sedimentation. Areas that have a slope of less than 15 percent are moderately suited to urban development.

The capability subclass is VIe. Based on yellow-poplar as the indicator species, the woodland ordination symbol is 6R.

MgD—Maymead-Greenlee-Potomac complex, 3 to 25 percent slopes. This map unit consists mainly of very deep, well drained Maymead and Greenlee soils and a very deep, somewhat excessively drained Potomac soil. The unit is in mountain coves and stream valleys. Slopes are gently sloping to moderately steep. Rock fragments on the surface of the Maymead soil range from boulders to cobbles, average about 1 foot in diameter, and are about 25 to 80 feet apart. Rock fragments on the surface of Greenlee soil range from boulders to cobbles, average about 30 inches in diameter, and are about 5 to 20 feet apart. The unit is about 30 percent Maymead soil, 30 percent Greenlee soil, and 30 percent Potomac soil. The three soils occur as areas so intricately mixed and so small in size that mapping them separately was not practical at the selected scale. Most areas are long and narrow or irregular in shape and range from about 10 to 75 acres in size.

The Maymead and Greenlee soils are strongly sloping and moderately steep. They are on foot slopes. The Potomac soil is gently sloping. It is on narrow flood plains.

Typically, the surface layer of the Maymead soil is dark brown fine sandy loam 5 inches thick. The upper 3 inches of the subsoil is dark yellowish brown fine sandy loam. The next 10 inches is yellowish brown sandy loam. The lower 24 inches is yellowish brown gravelly sandy loam. The underlying material to a depth of 60 inches is yellowish brown cobbly sandy loam.

Permeability is moderately rapid in the Maymead soil. Surface runoff is medium or rapid in bare or unprotected areas. The shrink-swell potential is low in the subsoil. The depth to bedrock is 40 to 70 inches. The seasonal high water table is below a depth of 6 feet.

Typically, the surface layer of the Greenlee soil is black very cobbly loam 3 inches thick. The upper 5 inches of the subsoil is dark brown very cobbly sandy loam. The next 18 inches is dark yellowish brown very cobbly sandy loam. The lower 44 inches is yellowish brown very cobbly loamy sand. The underlying material extends to a depth of 80 inches. It is strong brown very cobbly loamy sand that has yellowish red mottles.

Permeability is moderately rapid in the Greenlee soil. Surface runoff is medium or rapid in bare or unprotected areas. The shrink-swell potential is low in the subsoil. The depth to bedrock is more than 5 feet. The seasonal high water table is below a depth of 6 feet.

Typically, the surface layer of the Potomac soil is very dark grayish brown cobbly loamy sand 3 inches thick. The underlying material extends to a depth of 96 inches. In the upper 5 inches, it is yellowish brown cobbly loamy sand. In the lower 88 inches, it is yellowish brown very cobbly sand.

Permeability is rapid or very rapid in the Potomac soil. Surface runoff is medium in bare or unprotected areas. The shrink-swell potential is low in the underlying material. The depth to bedrock is more than 5 feet. The seasonal high water table is 4 to 6 feet below the surface. This soil is frequently flooded for brief periods.

Included in this unit in mapping are small intermingled areas of Tate, Cullasaja, and Tusquitee soils. Tate soils are on foot slopes and have a subsoil that is finer textured than that of the Maymead, Greenlee, and Potomac soils. Cullasaja soils have a dark surface layer that is more than 10 inches thick and are on foot slopes. Tusquitee soils have a dark surface

layer that is more than 7 inches thick and are on foot slopes. Included soils make up about 10 percent of the map unit.

Most of the acreage in this map unit is used as woodland.

This map unit is moderately suited to trees. Overstory trees include yellow-poplar, eastern hemlock, white oak, sweet birch, northern red oak, scarlet oak, red maple, black locust, eastern white pine, and white oak. Understory plants include rhododendron, mountain laurel, Fraser magnolia, dog hobble, New York fern, Christmas fern, galax, white snakeroot, greenbrier, honeysuckle, blackberry, poison ivy, sourwood, American holly, flowering dogwood, and wild grape.

The slope is the main limitation affecting woodland management in areas of the Maymead and Greenlee soils. It increases the hazard of erosion and limits the use of equipment. Wheeled tractors and vehicles that have high ground clearance can be operated only over carefully chosen routes. Logging roads and skid trails should be laid out on the contour. Water bars break the flow of water along roads. In exposed areas applying lime and fertilizer and seeding help to control erosion. Rock fragments on the surface of the Greenlee soil also are a limitation.

The rock fragments in the Greenlee and Potomac soils limit the available water capacity. Tree growth may be limited during dry periods. The seedling mortality rate is moderate on the Greenlee and Potomac soils. Reinforcement planting may be necessary. Flooding limits the use of planting and harvesting equipment in areas of the Potomac soil. Logging equipment should be operated only during dry periods.

This map unit is poorly suited to most of the field and truck crops commonly grown in the county. The slope and rock fragments on the surface are the main limitations in areas of the Maymead and Greenlee soils. The slope results in a severe hazard of erosion. The rock fragments make conventional tillage impractical. Droughtiness, rock fragments in the soil, and the frequent flooding are management concerns in areas of the Potomac soil.

This map unit is poorly suited to pasture and hay. The slope and rock fragments on the surface are the main limitations in areas of the Maymead and Greenlee soils. The rock fragments hinder mowing. Vehicles must be operated over carefully chosen routes. Droughtiness, rock fragments in the soil, and the frequent flooding are management concerns in areas of the Potomac soil.

This map unit is poorly suited to most urban uses. The slope is the main limitation in areas of the Maymead and Greenlee soils. Rock fragments throughout are a limitation in areas of the Greenlee and Potomac soils. The frequent flooding is a hazard in areas of the Potomac soil.

The capability subclass is VIe in areas of the Maymead soils, VIIs in areas of the Greenlee soil, and Vs in areas of the Potomac soil. Based on yellow-poplar as the indicator species, the woodland ordination symbol is 6R in areas of the Maymead soil, 8R in areas of the Greenlee soil, and 6F in areas of the Potomac soil.

NoE—Northcove very cobbly sandy loam, 10 to 45 percent slopes, very stony. This map unit consists mainly of very deep, well drained, moderately steep and steep Northcove and similar soils on foot slopes, benches, and colluvial fans. Rock fragments on the surface range from boulders to cobbles, average about 18 inches in diameter, and are about 3 to 25 feet apart (fig. 5). Most areas are long and narrow or irregular in shape and range from about 4 to 100 acres in size.

Typically, the surface layer is dark grayish brown very cobbly sandy loam 3 inches thick. The subsoil is 57 inches thick. The upper 3 inches of the subsoil is yellowish brown very cobbly sandy loam. The next 24 inches is light yellowish brown very cobbly sandy loam. The lower 30 inches is yellowish brown very cobbly loam. The underlying material extends to a depth of 80 inches. It is light yellowish brown very cobbly sandy loam.

Permeability is moderately rapid. Surface runoff is rapid in bare or unprotected areas. The shrink-swell potential is low in the subsoil. The depth to bedrock is more than 5 feet. The seasonal high water table is below a depth of 6 feet.

Included in this unit in mapping are small areas of Lonon, Junaluska, Brasstown, and Potomac soils. Lonon soils are intermingled with areas of the Northcove soil, have a subsoil that is finer textured than that of the Northcove soil, and have fewer rock fragments throughout. Junaluska and Brasstown soils formed in residuum and are on narrow remnants of ridges on some of the larger colluvial fans. Junaluska soils have fewer rock fragments throughout than the Northcove soil and have soft bedrock at a depth of 20 to 40 inches. Brasstown soils have a subsoil that is finer textured than that of the Northcove soil and have fewer rock fragments throughout. Potomac soils are coarser textured than the Northcove soil and are on flood plains. Included soils make up about 25 percent of the map unit.

Most of the acreage in this map unit is used as woodland.

This map unit is moderately suited to trees. Overstory trees include chestnut oak, scarlet oak, pitch

Figure 5.—Rock fragments on the surface in an area of Northcove very cobbly sandy loam, 10 to 45 percent slopes, very stony.

pine, yellow-poplar, white oak, and Virginia pine. Understory plants include rhododendron, mountain laurel, Fraser magnolia, dog hobble, Christmas fern, galax, white snakeroot, greenbrier, honeysuckle, blueberry, blackberry, poison ivy, sourwood, flowering dogwood, and wild grape. The quality of the woodland is relatively low because of low natural fertility, low precipitation, forest fires, and other factors.

The slope and rock fragments on and below the surface are the main limitations affecting woodland management. The slope increases the hazard of erosion and limits the use of equipment. Wheeled tractors and vehicles that have high ground clearance can be operated only over carefully chosen routes. Logging roads and skid trails should be laid out on the contour. Water bars break the flow of water along roads. In exposed areas applying lime and fertilizer and seeding help to control erosion. Rock fragments in the

soil reduce the amount of moisture available to plants and increase the seedling mortality rate. Reinforcement planting may be necessary.

This map unit is unsuited to most of the field and truck crops commonly grown in the county. The slope and rock fragments on and below the surface are the main limitations. The slope results in a severe hazard of erosion. The rock fragments make conventional tillage impractical and reduce the amount of water available for plant growth.

This map unit is poorly suited to pasture and hay. The slope and rock fragments on and below the surface are the main limitations. The rock fragments hinder mowing. Vehicles must be operated over carefully chosen routes.

This map unit is poorly suited to most urban uses. The slope and rock fragments throughout are the main limitations.

The capability subclass is VIIs. Based on yellow-poplar as the indicator species, the woodland ordination symbol is 5R.

PoD—Porters loam, 6 to 25 percent slopes, stony. This map unit consists mainly of deep, well drained, strongly sloping and moderately steep Porters and similar soils on high mountain ridgetops. Rock fragments on the surface range from boulders to cobbles, average about 1 foot in diameter, and are about 25 to 80 feet apart. Individual areas are long and narrow or irregular in shape and range from about 5 to 100 acres in size.

Typically, the surface layer is very dark grayish brown loam 9 inches thick. The upper 4 inches of the subsoil is dark yellowish brown loam. The next 10 inches is yellowish brown loam. The lower 3 inches is dark yellowish brown fine sandy loam. The underlying material to a depth of 48 inches is saprolite. In the upper 8 inches, it has a texture of yellowish brown fine sandy loam. In the lower 14 inches, it has a texture of dark yellowish brown loamy fine sand and has black and yellowish brown streaks. Soft, weathered gneiss bedrock is between depths of 48 and 59 inches. Hard, unweathered gneiss bedrock is at a depth of 59 inches. In some areas the depth to bedrock is more than 60 inches.

Permeability is moderately rapid. Surface runoff is rapid in bare or unprotected areas. The shrink-swell potential is low in the subsoil. The depth to bedrock is 40 to 60 inches. The seasonal high water table is below a depth of 6 feet.

Included in this unit in mapping are small intermingled areas of Ashe, Chestnut, Edneyville, and Craggey soils. Ashe, Chestnut, and Edneyville soils do not have a dark surface layer that is at least 7 inches thick. Ashe soils have hard bedrock at a depth of 20 to 40 inches. Chestnut soils have soft bedrock at a depth of 20 to 40 inches. Edneyville soils are very deep. Craggey soils have hard bedrock within a depth of 20 inches and are on knobs at high elevations. Included soils make up about 20 percent of the map unit.

Most of the acreage in this map unit is used as woodland.

This map unit is moderately suited to trees. Overstory trees include northern red oak, white oak, scarlet oak, yellow-poplar, chestnut oak, hickory, red maple, sweet birch, yellow birch, eastern hemlock, yellow buckeye, black locust, red spruce, blackgum, and eastern white pine. Understory plants include New York fern, mountain laurel, blueberry, sourwood, flowering dogwood, Fraser magnolia, rhododendron, striped maple, squawroot, Indianpipe, Indian cucumber, witchhazel, Christmas fern, greenbrier, and assorted wildflowers.

The slope is the main limitation affecting woodland management. It increases the hazard of erosion and limits the use of equipment. Logging roads and skid trails should be laid out on the contour. Water bars break the flow of water along roads. In exposed areas applying lime and fertilizer and seeding help to control erosion. In some areas trees have been broken or their growth has been stunted by high winds or ice.

This map unit is poorly suited to most cultivated crops. The slope and stones on the surface are the main limitations. The hazard of erosion is severe.

This map unit generally is poorly suited to pasture and hay. Rock fragments on the surface hinder the establishment of sod and mowing. Areas where the rock fragments have been removed from the surface are moderately suited to pasture and hay. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

This map unit is poorly suited to most urban uses because of the slope and the hazard of erosion. Areas used for building site development should be carefully selected. Most areas that have a slope of more than 15 percent require substantial cutting and filling. Areas that have a slope of less than 15 percent can be used for septic tank absorption fields if the fields are properly designed and installed.

The capability subclass is VIe. Based on yellow-poplar as the indicator species, the woodland ordination symbol is 7R.

PoF—Porters loam, 25 to 80 percent slopes, stony. This map unit consists mainly of deep, well drained, steep and very steep Porters and similar soils on high mountain side slopes. Rock fragments on the surface

range from boulders to cobbles, average about 1 foot in diameter, and are about 25 to 80 feet apart. Individual areas are elongated or irregular in shape and range from about 5 to 250 acres in size.

Typically, the surface layer is very dark grayish brown loam 9 inches thick. The upper 4 inches of the subsoil is dark yellowish brown loam. The next 10 inches is yellowish brown loam. The lower 3 inches is dark yellowish brown fine sandy loam. The underlying material to a depth of 48 inches is saprolite. In the upper 8 inches, it has a texture of yellowish brown fine sandy loam. In the lower 14 inches, it has a texture of dark yellowish brown loamy fine sand and has black and yellowish brown streaks. Soft, weathered gneiss bedrock is between depths of 48 and 59 inches. Hard, unweathered gneiss bedrock is at a depth of 59 inches. In some areas the depth to bedrock is more than 60 inches.

Permeability is moderately rapid. Surface runoff is rapid in bare or unprotected areas. The shrink-swell potential is low in the subsoil. The depth to bedrock is 40 to 60 inches. The seasonal high water table is below a depth of 6 feet.

Included in this unit in mapping are small intermingled areas of Ashe, Chestnut, Edneyville, Cleveland, Cullasaja, Tusquitee, and Craggey soils. Ashe, Chestnut, Edneyville, and Cleveland soils do not have a dark surface layer that is at least 7 inches thick. Ashe soils have hard bedrock at a depth of 20 to 40 inches. Chestnut soils have soft bedrock at a depth of 20 to 40 inches. Edneyville soils are very deep. Cleveland soils have hard bedrock at a depth of 10 to 20 inches. Cullasaja and Tusquitee soils formed in colluvium and are along drainageways on foot slopes and on benches. Cullasaja soils have more than 35 percent rock fragments throughout. Craggey soils have hard bedrock within a depth of 20 inches and are on shoulder slopes at high elevations. Included soils make up about 20 percent of the map unit.

Most of the acreage in this map unit is used as woodland.

This map unit is moderately suited to trees. Overstory trees include northern red oak, white oak, scarlet oak, yellow-poplar, chestnut oak, hickory, red maple, sweet birch, yellow birch, yellow buckeye, eastern hemlock, black locust, red spruce, blackgum, and eastern white pine. Understory plants include New York fern, mountain laurel, blueberry, sourwood, flowering dogwood, Fraser magnolia, rhododendron, squawroot, striped maple, witchhazel, Indianpipe, Indian cucumber, Christmas fern, greenbrier, and assorted wildflowers.

The slope is the main limitation affecting woodland management. The slope increases the hazard of erosion and limits the use of equipment. Extreme caution is needed when vehicles are operated on this soil. In most areas extensive grading is needed to establish roads and trails. Logging roads and skid trails should be laid out on the contour. Water bars break the flow of water along roads. Cable logging reduces the hazard of erosion and eliminates the need for most skid trails and logging roads. In exposed areas applying lime and fertilizer and seeding help to control erosion. In some areas trees have been broken or their growth has been stunted by ice and high winds.

This map unit is unsuited to most cultivated crops. The slope and stones on the surface are the main limitations. The hazard of erosion is severe.

This map unit is unsuited to pasture and hay. The slope and stones on the surface are the main limitations.

This map unit is unsuited to most urban uses because of the slope.

The capability subclass is VIIe. Based on yellow-poplar as the indicator species, the woodland ordination symbol is 7R.

PtB—Potomac cobbly loamy sand, 1 to 5 percent slopes, frequently flooded. This map unit consists mainly of very deep, somewhat excessively drained, nearly level and gently sloping Potomac and similar soils on flood plains at the headwaters of the major mountain streams. Stream velocity is usually high, and many areas contain numerous old stream channels. Most areas are long and narrow and range from about 10 to 200 acres in size.

Typically, the surface layer is very dark grayish brown cobbly loamy sand 3 inches thick. The underlying material extends to a depth of 96 inches. In the upper 5 inches, it is yellowish brown cobbly loamy sand. In the lower 88 inches, it is yellowish brown very cobbly sand.

Permeability is rapid or very rapid. Surface runoff is slow. The shrink-swell potential is low in the underlying material. The depth to bedrock is more than 5 feet. The seasonal high water table is 4 to 6 feet below the surface. This soil is frequently flooded for brief periods.

Included in this unit in mapping are small areas of Biltmore, Rosman, Greenlee, and Maymead soils. The sandy Biltmore soils and the loamy Rosman soils are away from stream channels, commonly in the slightly higher landscape positions. Biltmore, Rosman, and Maymead soils have less than 35 percent rock fragments throughout. The colluvial Greenlee and Maymead soils are on narrow foot slopes and benches at the base of uplands. Also included are scattered areas that have stones and boulders on the surface. Included areas make up about 30 percent of the map unit.

Most of the acreage in this map unit is used as woodland.

This map unit is moderately suited to trees. Overstory trees include American sycamore, yellow-poplar, green ash, red maple, sweet birch, black walnut, river birch, and eastern hemlock. Understory plants include alder, American hornbeam, black cherry, greenbrier, honeysuckle, blackberry, switchcane, poison ivy, and wild grape.

The rock fragments in the soil are the main limitation affecting woodland management. They limit the available water capacity and increase the seedling morality rate. Reinforcement planting may be necessary. The frequent flooding limits the use of planting and harvesting equipment. Logging equipment should be operated only during dry periods.

This map unit is poorly suited to cultivated crops, hay, pasture, and urban uses. Droughtiness, rock fragments on and in the soil, and the frequent flooding are the major management concerns.

This map unit is a good source of gravel. Because the gravel is sieved from the source material, sand is a by-product. The frequent flooding is the main hazard affecting this use.

The capability subclass is Vs. Based on yellow-poplar as the indicator species, the woodland ordination symbol is 6F.

PxA—Potomac-lotla complex, 0 to 3 percent slopes, mounded, frequently flooded. This map unit consists mainly of a very deep, somewhat excessively drained, nearly level Potomac soil and a very deep, somewhat poorly drained, nearly level lotla soil. These soils are on flood plains along streams near Dysartsville and Vein Mountain. The unit is about 40 percent Potomac soil and 35 percent lotla soil. The two soils occur as areas that are so small and so intricately mixed that mapping them separately was not practical at the selected scale. The unit is frequently flooded for brief periods. Most areas are long and narrow and range from about 10 to 50 acres in size.

Areas of this map unit were extensively mined for gold during the 1800's and early 1900's. Large amounts of soil material were dug up and washed through sluices, panned by hand, or transported by rail to places that could separate out the gold. Most of the acreage in this map unit is covered by numerous small earthen mounds or tailing piles and by small artificial channels and depressions. Some of the channels and depressions are filled with water during wet periods.

Typically, the surface layer of the Potomac soil is very dark grayish brown cobbly loamy sand 3 inches thick. The underlying material extends to a depth of 96 inches. In the upper 5 inches, it is yellowish brown cobbly loamy sand. In the lower 88 inches, it is yellowish brown very cobbly sand.

Permeability is rapid or very rapid in the Potomac soil. Surface runoff is slow. The shrink-swell potential is low in the underlying material. The depth to bedrock is more than 5 feet. The seasonal high water table is 4 to 6 feet below the surface.

Typically, the surface layer of the lotla soil is dark yellowish brown sandy loam 12 inches thick. The underlying material extends to a depth of 60 inches. In sequence downward, it is 9 inches of dark yellowish brown loam that has dark grayish brown mottles; 5 inches of dark grayish brown fine sandy loam that has yellowish brown and dark brown mottles; 4 inches of mottled light brownish gray, dark gray, and light yellowish brown sand; 10 inches of very dark gray loam; and 10 inches of light brownish gray gravelly sand.

Permeability is moderately rapid or rapid in the underlying material in the lotla soil. Surface runoff is slow. The shrink-swell potential is low in the underlying material. The depth to bedrock is more than 5 feet. The seasonal high water table is 1.5 to 3.5 feet below the surface.

Included in this unit in mapping are small areas of loamy, well drained Colvard and Tate soils. Colvard soils are intermingled with areas of the Potomac and lotla soils. Tate soils are on foot slopes at the base of uplands along stream valleys. Included soils make up about 25 percent of the map unit.

Most of the acreage in this map unit is used as woodland.

This map unit is moderately suited to trees. Overstory trees include American sycamore, yellow-poplar, green ash, red maple, sweet birch, black walnut, river birch, and eastern hemlock. Understory plants include alder, American hornbeam, black cherry, greenbrier, honeysuckle, blackberry, giant cane, poison ivy, and wild grape.

The rock fragments in the Potomac soil limit the available water capacity and increase the seedling mortality rate. Reinforcement planting may be necessary on the Potomac soil. The frequent flooding limits the use of planting and harvesting equipment. Logging equipment should be operated only during dry periods.

This map unit is poorly suited to most of the field and truck crops commonly grown in the area because of the mounds on the surface and the frequent flooding. Droughtiness and rock fragments throughout the soil are major limitations in areas of the Potomac soil. Wetness is a limitation in areas of the lotla soil. In some areas of the lotla soil, a surface and subsurface drainage system is needed. Land smoothing is necessary to bring these soils into production.

This map unit is poorly suited to pasture and hay because of the mounds on the surface. Droughtiness and rock fragments throughout the soil are limitations in areas of the Potomac soil. Wetness is a limitation in areas of the Iotla soil. In some areas of the Iotla soil, a surface and subsurface drainage system is needed. The frequent flooding is a hazard. Land smoothing is necessary to convert areas of these soils to pasture or hayland.

This map unit is poorly suited to most urban uses because of the frequent flooding. Wetness is a limitation in areas of the Iotla soil.

The capability subclass is Vs in areas of the Potomac soil and IIw in areas of the Iotla soil. Based on yellow-poplar as the indicator species, the woodland ordination symbol is 6F in areas of the Potomac soil and 8A in areas of the Iotla soil.

RaD—Rabun loam, 6 to 25 percent slopes. This map unit consists mainly of very deep, well drained, strongly sloping and moderately steep Rabun and similar soils on low mountain ridgetops. Individual areas are long and narrow or irregular in shape and range from about 5 to 30 acres in size.

Typically, the surface layer is loam. In the upper 6 inches, it is dark reddish brown. In the lower 3 inches, it also is dark reddish brown. The subsoil extends to a depth of 72 inches. In the upper 24 inches, it is dark red clay loam. In the lower 39 inches, it is dark red clay. In some eroded areas the surface layer is clay loam.

Permeability is moderate. Surface runoff is rapid in bare or unprotected areas. The shrink-swell potential is low in the subsoil. The depth to bedrock is more than 7 feet. The seasonal high water table is below a depth of 6 feet.

Included in this unit in mapping are small intermingled areas of Junaluska and Brasstown soils. Junaluska soils, which have soft bedrock at a depth of 20 to 40 inches, and Brasstown soils, which have soft bedrock at a depth of 40 to 60 inches, are in transitional areas near the edge of some mapped areas. Also included are scattered areas that have a cobbly surface layer. Included areas make up about 15 percent of the map unit.

Most of the acreage in this map unit is used as woodland.

This map unit is moderately suited to trees. Overstory trees include white oak, scarlet oak, yellow-poplar, chestnut oak, northern red oak, hickory, red maple, Virginia pine, blackgum, and eastern white pine. Understory plants include mountain laurel, blueberry, sourwood, flowering dogwood, Fraser magnolia, rhododendron, Christmas fern, and greenbrier.

The slope is the main limitation affecting woodland management. It increases the hazard of erosion and limits the use of equipment. Logging roads and skid trails should be laid out on the contour. Water bars break the flow of water along roads. In exposed areas applying lime and fertilizer and seeding help to control erosion.

This map unit is poorly suited to most cultivated crops. The slope is the main limitation. The hazard of erosion is severe.

This map unit is moderately suited to pasture and hay. The slope is the main limitation. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

This map unit is poorly suited to most urban uses because of the slope and the hazard of erosion. Areas used for building site development should be carefully selected. Most areas that have a slope of more than 15 percent require substantial cutting and filling. Areas that have a slope of less than 15 percent can be used for septic tank absorption fields if the fields are properly designed and installed.

The capability subclass is VIe. Based on yellow-poplar as the indicator species, the woodland ordination symbol is 8R.

RaE—Rabun loam, 25 to 50 percent slopes. This map unit consists mainly of very deep, well drained, steep Rabun and similar soils on low mountain side slopes. Individual areas are somewhat elongated or irregular in shape and range from about 5 to 40 acres in size.

Typically, the surface layer is loam. In the upper 6 inches, it is dark reddish brown. In the lower 3 inches, it also is dark reddish brown. The subsoil extends to a depth of 72 inches. In the upper 24 inches, it is dark red clay loam. In the lower 39 inches, it is dark red clay. In some eroded areas the surface layer is clay loam.

Permeability is moderate. Surface runoff is rapid in bare or unprotected areas. The shrink-swell potential is low in the subsoil. The depth to bedrock is more than 7 feet. The seasonal high water table is below a depth of 6 feet.

Included in this unit in mapping are small intermingled areas of Junaluska, Brasstown, and Lonon soils. Junaluska soils, which have soft bedrock at a depth of 20 to 40 inches, and Brasstown soils, which have soft bedrock at a depth of 40 to 60 inches, are in transitional areas near the edge of some mapped areas. Lonon soils formed in colluvium and are along drainageways on foot slopes and on benches. Also included are scattered areas that have a cobbly surface layer. Included areas make up about 15 percent of the map unit.

Most of the acreage in this map unit is used as woodland.

This map unit is moderately suited to trees. Overstory trees include white oak, scarlet oak, yellow-poplar, chestnut oak, northern red oak, hickory, red maple, Virginia pine, blackgum, and eastern white pine. Understory plants include mountain laurel, blueberry, sourwood, flowering dogwood, Fraser magnolia, rhododendron, Christmas fern, and greenbrier.

The slope is the main limitation affecting woodland management. It increases the hazard of erosion and limits the use of equipment. Extreme caution is needed when vehicles are operated on these soils. Logging roads and skid trails should be laid out on the contour. Water bars break the flow of water along roads. Cable logging reduces the hazard of erosion and can eliminate the need for most skid trails and logging roads. In exposed areas applying lime and fertilizer and seeding help to control erosion.

This map unit is unsuited to most cultivated crops. The slope is the main limitation. The hazard of erosion is severe.

This map unit is unsuited to pasture and hay. The slope is the main limitation.

This map unit is unsuited to most urban uses because of the slope and a severe hazard of erosion.

The capability subclass is VIIe. Based on yellow-poplar as the indicator species, the woodland ordination symbol is 8R.

RoA—Rosman loam, 0 to 3 percent slopes, occasionally flooded. This map unit consists mainly of very deep, well drained, nearly level Rosman and similar soils on flood plains adjacent to streams. Most areas are long and narrow and range from about 4 to 50 acres in size.

Typically, the surface layer is dark brown loam 11 inches thick. The subsoil is dark yellowish brown loam 29 inches thick. The underlying material extends to a depth of 70 inches. In the upper 20 inches, it is yellowish brown fine sandy loam. In the lower 10 inches, it is dark yellowish brown loam.

Permeability is moderately rapid. Surface runoff is slow. The shrink-swell potential is low in the subsoil. The depth to bedrock is more than 5 feet. The seasonal high water table is 4 to 5 feet below the surface. This soil is occasionally flooded for very brief periods.

Included in this unit in mapping are small areas of Elsinboro, Iotla, Biltmore, and Potomac soils. The finer textured Elsinboro soils are on low terraces. The somewhat poorly drained Iotla soils are in depressions at the base of uplands. The dominantly sandy Biltmore soils are adjacent to stream channels and on the inside of the curve at the bends of the larger streams. Potomac soils average more than 35 percent rock fragments throughout. They are on the higher parts of some mapped areas where stream velocity is high. Also included are small areas that have a gravelly or cobbly surface layer. Included areas make up about 15 percent of the map unit.

Most of the acreage in this map unit is used as cropland.

This map unit is well suited to trees. Overstory trees include American sycamore, green ash, red maple, yellow-poplar, black walnut, river birch, and black willow. Understory plants include alder, American hornbeam, black cherry, greenbrier, honeysuckle, blackberry, switchcane, poison ivy, and wild grape.

No significant limitations affect woodland management. The occasional flooding limits the use of planting and harvesting equipment. Logging equipment should be operated only during dry periods.

This map unit is well suited to most of the field and truck crops commonly grown in the county. Ornamental shrubs and trees grow well on this soil (fig. 6). The occasional flooding is a hazard. Returning crop residue to the soil and planting winter cover crops increase the content of organic matter and thus improve fertility, the available water capacity, and tilth.

This map unit is well suited to pasture and hay. The occasional flooding is a management concern. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

This map unit is poorly suited to most urban uses. The occasional flooding is a severe hazard. Some areas can be used for recreational purposes that are not so seriously affected by the flooding. Examples are ball fields and playgrounds.

The capability subclass is IIw. Based on yellow-poplar as the indicator species, the woodland ordination symbol is 8A.

SoD—Soco-Ditney complex, 6 to 25 percent slopes, stony. This map unit consists mainly of moderately deep, well drained, strongly sloping and moderately steep Soco and Ditney soils on mountain ridgetops. Rock fragments on the surface range from boulders to cobbles, average about 1 foot in diameter, and are about 25 to 80 feet apart. The unit is about 40 percent Soco soil and 40 percent Ditney soil. The two soils occur as areas so intricately mixed that mapping them separately was not practical at the selected scale. Individual areas are long and narrow or irregular in shape and range from about 5 to 100 acres in size.

The Soco and Ditney soils are in the same landscape position. The major difference between these soils is the hardness of the underlying bedrock.

Figure 6.—Ornamental shrubs and trees in an area of Rosman loam, 0 to 3 percent slopes, occasionally flooded.

Typically, the surface layer of the Soco soil is very dark grayish brown gravelly fine sandy loam 3 inches thick. The subsoil is yellowish brown loam 25 inches thick. Soft quartzite bedrock is between depths of 28 and 48 inches. Hard quartzite bedrock is at a depth of 48 inches.

Permeability is moderately rapid in the Soco soil. Surface runoff is rapid in bare or unprotected areas. The shrink-swell potential is low in the subsoil. The depth to soft bedrock is 20 to 40 inches. The depth to hard bedrock is more than 40 inches. The seasonal high water table is below a depth of 6 feet.

Typically, the surface layer of the Ditney soil is gravelly fine sandy loam. In the upper 2 inches, it is very dark grayish brown. In the 5 lower inches, it is brown. The subsoil is yellowish brown cobbly fine sandy loam 20 inches thick. Hard quartzite bedrock is at a depth of 27 inches.

Permeability is moderately rapid in the Ditney soil. Surface runoff is rapid in bare or unprotected areas. The shrink-swell potential is low in the subsoil. The depth to hard bedrock is 20 to 40 inches. The seasonal high water table is below a depth of 6 feet.

Included in this unit in mapping are small intermingled areas of Junaluska soils. These soils are finer textured than the Soco and Ditney soils and have a few stones on the surface. They are on broad ridgetops. Also included are some areas of soils that have soft bedrock between depths of 40 and 60 inches on broad ridgetops and some areas on high knobs

where adverse climatic conditions, such as high winds and ice, have stunted the growth of trees. Included areas make up about 20 percent of the map unit.

Most of the acreage in this map unit supports hardwoods and pine.

This map unit is moderately suited to trees. Overstory trees include chestnut oak, scarlet oak, pitch pine, Table Mountain pine, red maple, eastern white pine, and Virginia pine. Understory plants include mountain laurel, blueberry, blackgum, sourwood, greenbrier, and galax. The quality of the woodland is relatively low because of low natural fertility, droughtiness, forest fires, and other factors.

The slope, the depth to bedrock, and droughtiness are the main limitations affecting woodland management. The slope increases the hazard of erosion and limits the use of equipment. Logging roads and skid trails should be laid out on the contour. Water bars break the flow of water along roads. In exposed areas applying lime and fertilizer and seeding help to control erosion. The depth to bedrock results in a moderate hazard of windthrow. Thinning should be held to a minimum, or the stand should not be thinned at all. A plan for the periodic removal of windthrown trees is advisable. Droughtiness increases the seedling mortality rate. Reinforcement planting may be necessary.

This map unit generally is poorly suited to cultivated crops, pasture, and hay because of the slope, the depth to bedrock, droughtiness, and rock fragments on the surface. The slope results in a severe hazard of erosion. The depth to bedrock limits the thickness of the root zone and the amount of water available for plant growth. The rock fragments hinder cultivation and mowing. Areas where the rock fragments have been removed from the surface are moderately suited to pasture and hay.

This map unit is poorly suited to urban uses because of the slope and the depth to bedrock.

The capability subclass is VIe. Based on chestnut oak as the indicator species, the woodland ordination symbol is 4R in areas of the Soco soil and 2R in areas of the Ditney soil.

SoF—Soco-Ditney complex, 25 to 80 percent slopes, stony. This map unit consists mainly of moderately deep, well drained, steep and very steep Soco and Ditney soils on mountain ridgetops and side slopes. Rock fragments on the surface range from boulders to cobbles, average about 1 foot in diameter, and are about 25 to 80 feet apart. The unit is about 40 percent Soco soil and 40 percent Ditney soil. The two soils occur as areas so intricately mixed that mapping them separately was not practical at the selected scale. Individual areas are irregular in shape and range from about 5 to 300 acres in size.

The Soco and Ditney soils are in the same landscape position. The major difference between these soils is the hardness of the underlying bedrock.

Typically, the surface layer of the Soco soil is very dark grayish brown gravelly fine sandy loam 3 inches thick. The subsoil is yellowish brown loam 25 inches thick. Soft quartzite bedrock is between depths of 28 and 48 inches. Hard quartzite bedrock is at a depth of 48 inches.

Permeability is moderately rapid in the Soco soil. Surface runoff is rapid in bare or unprotected areas. The shrink-swell potential is low in the subsoil. The depth to soft bedrock is 20 to 40 inches. The depth to hard bedrock is more than 40 inches. The seasonal high water table is below a depth of 6 feet.

Typically, the surface layer of the Ditney soil is gravelly fine sandy loam. In the upper 2 inches, it is very dark grayish brown. In the lower 5 inches, it is brown. The subsoil is yellowish brown cobbly fine sandy loam 20 inches thick. Hard quartzite bedrock is at a depth of 27 inches.

Permeability is moderately rapid in the Ditney soil. Surface runoff is rapid in bare or unprotected areas. The shrink-swell potential is low in the subsoil. The depth to hard bedrock is 20 to 40 inches. The seasonal high water table is below a depth of 6 feet.

Included in this unit in mapping are small intermingled areas of Junaluska and Northcove soils. Junaluska soils are finer textured than the Soco and Ditney soils and have a few stones on the surface. They are on low slopes. The colluvial Northcove soils average more than 35 percent rock fragments throughout. They are along drainageways and on benches and foot slopes. Also included on the lower part of some slopes are soils that have soft bedrock between depths of 40 and 60 inches. Included soils make up about 20 percent of the map unit.

Most of the acreage in this map unit supports hardwoods and pine.

This map unit is moderately suited to trees. Overstory trees include chestnut oak, scarlet oak, pitch pine, Table Mountain pine, red maple, eastern white pine, and Virginia pine. Understory plants include mountain laurel, blueberry, blackgum, sourwood, greenbrier, and galax. The quality of the woodland is relatively low because of low natural fertility, low precipitation, forest fires, and other factors.

The slope, the depth to bedrock, and droughtiness are the main limitations affecting woodland management. The slope increases the hazard of erosion and limits the use of equipment. Extreme

caution is needed when vehicles are operated on these soils. In most areas extensive grading is needed to establish roads and trails. Logging roads and skid trails should be laid out on the contour. Water bars break the flow of water along roads.

Cable logging reduces the hazard of erosion and can eliminate the need for most skid trails and logging roads. In exposed areas applying lime and fertilizer and seeding help to control erosion. The depth to bedrock results in a moderate hazard of windthrow. Thinning should be held to a minimum, or the stand should not be thinned at all. A plan for the periodic removal of windthrown trees is advisable. Droughtiness increases the seedling mortality rate. Reinforcement planting may be necessary.

This map unit is unsuited to cultivated crops, pasture, hay, and most urban uses because of the slope, the depth to bedrock, and rock fragments on the surface.

The capability subclass is VIIe. Based on chestnut oak as the indicator species, the woodland ordination symbol is 4R in areas of the Soco soil and 2R in areas of the Ditney soil.

TaC—Tate loam, 6 to 15 percent slopes. This map unit consists mainly of very deep, well drained, strongly sloping Tate and similar soils on mountain foot slopes, benches, and colluvial fans. Most areas are long and narrow or irregular in shape and range from about 4 to 40 acres in size.

Typically, the surface layer is very dark grayish brown loam 5 inches thick. The upper 8 inches of the subsoil is reddish yellow loam. The lower 31 inches is strong brown clay loam. The underlying material to a depth of 60 inches is yellowish brown gravelly loam. In a few scattered areas, the subsoil is red or yellowish red.

Permeability is moderate in the subsoil and moderately rapid in the substratum. Surface runoff is medium or rapid in bare or unprotected areas. The shrink-swell potential is low in the subsoil. The depth to bedrock is more than 6 feet. The seasonal high water table is below a depth of 6 feet.

Included in this unit in mapping are small intermingled areas of Greenlee, Maymead, Iotla, and Tusquitee soils. Greenlee soils have more than 35 percent rock fragments throughout. Maymead soils have a subsoil that is coarser textured than that of the Tate soil. Iotla soils are somewhat poorly drained and are along small drainageways that cross the mapped areas. Tusquitee soils have a dark surface layer that is more than 7 inches thick. Included soils make up about 15 percent of the map unit.

Most of the acreage in this map unit is used as woodland.

This map unit is well suited to trees. Overstory trees include yellow-poplar, eastern hemlock, white oak, sweet birch, northern red oak, red maple, black locust, eastern white pine, and Virginia pine. Understory plants include rhododendron, mountain laurel, Fraser magnolia, dog hobble, New York fern, Christmas fern, galax, white snakeroot, greenbrier, honeysuckle, blackberry, poison ivy, sourwood, American holly, flowering dogwood, and wild grape. No significant limitations affect woodland management.

This map unit is moderately suited to most of the field and truck crops commonly grown in the county. The slope and the hazard of erosion are the main limitations. Conservation tillage, contour farming, grassed waterways, and field borders help to control erosion. Returning crop residue to the soil and planting winter cover crops increase the content of organic matter and thus improve fertility, the available water capacity, and tilth.

This map unit is well suited to pasture and hay. The slope is the main limitation. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

This map unit is moderately suited to most urban uses. The slope is the main limitation. Management practices are needed in unvegetated areas to help to control erosion and offsite damage caused by sedimentation.

The capability subclass is IVe. Based on yellow-poplar as the indicator species, the woodland ordination symbol is 6A.

TaD—Tate loam, 15 to 25 percent slopes. This map unit consists mainly of very deep, well drained, moderately steep Tate and similar soils on mountain foot slopes, benches, and colluvial fans. Most areas are long and narrow or irregular in shape and range from about 4 to 40 acres in size.

Typically, the surface layer is very dark grayish brown loam 5 inches thick. The upper 8 inches of the subsoil is reddish yellow loam. The lower 31 inches is strong brown clay loam. The underlying material to a depth of 60 inches is yellowish brown gravelly loam. In a few scattered areas, the subsoil is red or yellowish red.

Permeability is moderate in the subsoil and moderately rapid in the substratum. Surface runoff is rapid in bare or unprotected areas. The shrink-swell potential is low in the subsoil. The depth to bedrock is more than 6 feet. The seasonal high water table is below a depth of 6 feet.

Included in this unit in mapping are small intermingled areas of Greenlee, Maymead, Iotla, and

Tusquitee soils. Greenlee soils have more than 35 percent rock fragments throughout. Maymead soils have a subsoil that is coarser textured than that of the Tate soil. Iotla soils are somewhat poorly drained and are along small drainageways that cross the mapped areas. Tusquitee soils have a dark surface layer that is more than 7 inches thick. Included soils make up about 15 percent of the map unit.

Most of the acreage in this map unit is used as woodland.

This map unit is moderately suited to trees. Overstory trees include yellow-poplar, eastern hemlock, white oak, sweet birch, northern red oak, red maple, black locust, eastern white pine, and Virginia pine. Understory plants include rhododendron, mountain laurel, Fraser magnolia, dog hobble, New York fern, Christmas fern, galax, white snakeroot, greenbrier, honeysuckle, blackberry, poison ivy, sourwood, American holly, flowering dogwood, and wild grape.

The slope is the main limitation affecting woodland management. It increases the hazard of erosion and limits the use of equipment. Logging roads and skid trails should be laid out on the contour. Water bars break the flow of water along roads. In exposed areas applying lime and fertilizer and seeding help to control erosion.

This map unit is poorly suited to most of the field and truck crops commonly grown in the county. The slope and the hazard of erosion are the main limitations.

This map unit is moderately suited to pasture and hay. The slope is the main limitation. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

This map unit is poorly suited to most urban uses. The slope is the main limitation. Areas used for building site development should be carefully selected. Most areas require substantial cutting and filling. Management practices are needed in unvegetated areas to help to control erosion and offsite damage caused by sedimentation.

The capability subclass is VIe. Based on yellow-poplar as the indicator species, the woodland ordination symbol is 6R.

Uf—Udifluvents, sandy, frequently flooded. This map unit consists mainly of sandy alluvium and sandy spoil deposited during sand and gravel mining (fig. 7). It is on flood plains. The topography of the map unit is undulating. It consists of irregularly shaped slopes and includes berms, shallow excavations, old stream channels, and small bodies of water in the deeper pits. Slopes are generally less than 6 percent but are nearly vertical on some short cut slopes. Individual areas range from about 5 to 100 acres in size.

The soil material in this map unit is unconsolidated, well drained alluvium and spoil. It is sandy or loamy and includes the gravelly, very gravelly, cobbly, and very cobbly analogues of these textures. It generally has thin layers of loamy material within the upper 40 inches.

Permeability is rapid. Surface runoff is slow. The hazard of erosion is minimal. The shrink-swell potential is low. The depth to bedrock is more than 5 feet. The seasonal high water table is generally below a depth of 4 feet. This map unit is frequently flooded for brief periods.

Included in this unit in mapping are small areas of Biltmore and Potomac soils. These soils have an A horizon and are on the smooth slopes in undisturbed areas. Also included are a few wet spots in deep excavations having little or no surface runoff. Included soils make up about 20 percent of the map unit.

Most of the acreage in this map unit is in various stages of reclamation. Some areas have been seeded to grass, kudzu, lespedeza, or loblolly pine. Other areas are naturally reseeding to hardwoods, weeds, and wild grasses. A few areas are still mined for sand and gravel.

This map unit generally is poorly suited to cultivated crops, woodland, pasture, hay, and urban uses. Droughtiness, rock fragments in the soil, the frequent flooding, and the uneven topography are major problems. Some areas that have been smoothed are suitable for woodland or recreational uses.

The capability subclass is VIs. This map unit has not been assigned a woodland ordination symbol.

Uo—Udorthents, loamy. This map unit consists of areas that have been cut or filled during grading for roads, railroads, dwellings, recreational areas, and similar uses. Slopes are very complex. They are nearly level to very steep and range from 0 to 60 percent. The extent of erosion varies considerably. Some areas are slightly eroded. Other areas are severely eroded, having gullies as deep as 10 feet. The areas of cut and fill materials are so intricately mixed that mapping them separately was not practical at the selected scale. Individual areas range from about 5 to 40 acres in size.

The cuts generally are the steepest part of the map unit. The exposed material generally is loamy. The fill material generally is variegated saprolite that was removed from the cuts. Areas that have been filled are not as steep as the cuts. In some areas the fill material is highly compacted.

Permeability varies in this map unit. Surface runoff is medium or rapid in bare or unprotected areas. The depth to bedrock varies. The seasonal high water table

Figure 7.—An area of Udifluvents, sandy, frequently flooded. This map unit consists of sandy alluvium and spoil deposited during sand and gravel mining.

generally is below a depth of 6 feet. Areas in the uplands are not subject to flooding. Some fill areas on flood plains are subject to rare or occasional flooding.

Included in this unit in mapping are small areas of undisturbed soil and areas that have been cut down to bedrock. Also included are a few small areas of nonsoil fill material, such as building rubbish, cinders, industrial wastes, incinerator ash, and other solid garbage, and a few areas of clayey fill material. Included areas make up about 20 percent of the map unit.

Areas of this map unit vary widely in their suitability and limitations for different land uses. If water and sewer services can be provided, the nearly level and gently sloping cut areas generally are moderately suited to building sites and recreational uses. Because these areas are somewhat droughty, landscaping and vegetating can be difficult. The steep cut areas generally are poorly suited or moderately suited to most land uses.

The fill areas generally are subject to subsidence and

may be unsuited to building sites. The nearly level and gently sloping fill areas that are not highly compacted are moderately suited to landscaping and to recreational uses.

Because this map unit is so variable, onsite investigation is needed before use and management can be planned.

The capability subclass is VIIe. This map unit has not been assigned a woodland ordination symbol.

Ur—Urban land. This map unit consists of nearly level to moderately sloping areas where more than 85 percent of the surface is covered by asphalt, concrete, buildings, or other impervious surfaces. Examples are parking lots, shopping centers, business centers, and industrial sites. Individual areas generally range from about 5 to 50 acres in size.

Included in this unit in mapping are small areas of Udorthents. These areas consist primarily of loamy cut and fill material. They are not covered with impervious surfaces and generally are used for lawns or landscaping. Also included are a few areas of undisturbed soils. Included areas make up less than 15 percent of the map unit.

Examination of the soil properties in this map unit is impractical. Careful onsite investigation is needed before use and management can be planned.

The capability subclass is VIIIs. This map unit has not been assigned a woodland ordination symbol.

Prime Farmland

In this section, prime farmland is defined and the soils in McDowell County that are considered prime farmland are listed.

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the Nation's short- and long-range needs for food and fiber. The acreage of high-quality farmland is limited, and the U.S. Department of Agriculture recognizes that government at local, State, and Federal levels, as well as individuals, must encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland soils, as defined by the U.S. Department of Agriculture, are soils that are best suited to food, feed, forage, fiber, and oilseed crops. Such soils have properties that favor the economic production of sustained high yields of crops. The soils need only to be treated and managed by acceptable farming methods. The moisture supply must be adequate, and the growing season must be sufficiently long. Prime farmland soils produce the highest yields with minimal expenditure of energy and economic resources. Farming these soils results in the least damage to the environment.

Prime farmland soils may presently be used as cropland, pasture, or woodland or for other purposes. They are used for food or fiber or are available for these uses. Urban or built-up land, public land, and water areas cannot be considered prime farmland. Urban or built-up land is any contiguous unit of land 10 acres or more in size that is used for such purposes as housing, industrial, and commercial sites, sites for institutions or public buildings, small parks, golf courses, cemeteries, railroad yards, airports, sanitary landfills, sewage treatment plants, and water-control structures. Public land is land not available for farming in National forests, National parks, military reservations, and State parks.

Prime farmland soils usually receive an adequate and dependable supply of moisture from precipitation or irrigation. The temperature and growing season are favorable. The acidity or alkalinity level of the soils is acceptable. The soils have few or no rocks and are permeable to water and air. They are not excessively erodible or saturated with water for long periods and are not frequently flooded during the growing season. The slope ranges mainly from 0 to 8 percent.

The prime farmland map units make up about 17,753 acres, or about 6.3 percent of the county. Other areas of prime farmland that are too small to show at the selected scale in mapping are throughout the mountain valleys. These areas are included in mapping with other map units.

In McDowell County, the loss of prime farmland to other uses puts pressure on marginal, more sloping lands.

The following map units are considered prime farmland in McDowell County. The location of each map unit is shown on the detailed soil maps at the back of this publication. The extent of each unit is given in table 4. The soil qualities that affect use and management are described in the section "Detailed Soil Map Units." This list does not constitute a recommendation for a particular land use.

Some soils that have a high water table and all soils that are frequently flooded during the growing season qualify as prime farmland only in areas where these limitations have been overcome by drainage measures or flood control. If applicable, the need for these measures is indicated in parentheses after the map unit name in the following list. Onsite evaluation is necessary to determine whether or not limitations have been overcome by corrective measures.

The soils identified as prime farmland in McDowell County are:

BrB2	Braddock clay loam, 2 to 6 percent slopes, eroded
CoA	Colvard loam, 0 to 2 percent slopes, occasionally flooded (where protected from flooding or not frequently flooded during the growing season)
DdB	Dillard loam, 1 to 4 percent slopes, rarely flooded
EsB	Elsinboro loam, 1 to 4 percent slopes, rarely flooded

IoA Iotla sandy loam, 0 to 2 percent slopes, occasionally flooded (where drained and either protected from flooding or not frequently flooded during the growing season)

RoA Rosman loam, 0 to 3 percent slopes, occasionally flooded (where protected from flooding or not frequently flooded during the growing season)

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help to prevent soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis for predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help to prevent construction failures caused by unfavorable soil properties.

Generally, the soils in McDowell County that are well suited to crops also are well suited to urban uses. The data concerning specific soils in the county can be used in planning future land use patterns. The potential for farming should be considered relative to any soil limitations and the potential for nonfarm development.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern that is in harmony with nature.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Crops and Pasture

Larry L. Hendrix, district conservationist, and Bobby G. Brock, conservationist agronomist, Natural Resources Conservation Service, and J.R. Mabe, county extension director, and Mario DeLuica, agriculture extension agent, North Carolina Cooperative Extension Service, helped prepare this section.

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils are identified; the system of land capability classification used by the Natural Resources Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under the heading "Detailed Soil Map Units" and in the tables. Specific information can be obtained from the local office of the Natural Resources Conservation Service or the North Carolina Cooperative Extension Service.

The acreage used for cropland slightly decreased during the 1980's in McDowell County. Because of a lack of profitability of row crops, cropland was converted to pasture, hayland, and in some areas to use for nursery crops and ornamental crops.

In 1987, McDowell County had approximately 2,660 acres of cropland, 500 acres of orchards, 4,000 acres of pasture and hayland, and 390 acres of nursery crops, ornamental crops, and Christmas trees. Burley tobacco was grown on 6 acres; corn on 1,700 acres; soybeans on 300 acres; sugar cane on 8 acres; and small grain, including wheat, oats, barley, and rye, on 130 acres. About 450 acres was used for snap beans, Irish potatoes, sweet potatoes, cabbage, melons, strawberries, sweet corn, tomatoes, pepper, cucumbers, blueberries, okra, squash, and other vegetables and fruits. Approximately 70 acres of cropland was idle or used in a rotational cropping system. The majority of the pasture and hayland was used for tall fescue. A small acreage was used for alfalfa, orchardgrass, or red clover.

The nursery crops and ornamental crops include eastern hemlock, Norway spruce, eastern white pine,

dogwood, pear, boxwood, and blue spruce. Fraser fir and eastern white pine are the main Christmas trees.

The latest information on growing special crops can be obtained from the local offices of the North Carolina Cooperative Extension Service or the Natural Resources Conservation Service. Information is available concerning site selection, applications of fertilizer and lime, and selection of plant varieties.

Cropland Management

Most of the cropland in McDowell County is on flood plains or low stream terraces. Because these areas are relatively flat, erosion is not a major problem on most of the cropland in the county.

Soils on flood plains and stream terraces are subject to varying degrees of flooding. Biltmore, Colvard, Iotla, and Rosman soils are occasionally flooded. Dillard and Elsinboro soils are subject to rare flooding. Flooding during the growing season can be very damaging to crops. Some areas of the Colvard and Iotla soils in the Muddy Creek watershed have some protection resulting from watershed dams.

Erosion is a major concern on only a small acreage of the cropland in the county. Generally, the Hayesville, Braddock, Elsinboro, and Dillard soils that have a slope of less than 15 percent are used for cropland. These soils are subject to accelerated erosion. Most of the upland farming is done in areas of the Hayesville and Braddock soils, which have already lost part of their topsoil. They are in particular need of erosion-control measures.

Loss of the surface layer is damaging for various reasons. Productivity decreases as the surface layer is lost and plowing mixes material from the subsoil into the surface layer. Loss of the surface layer is especially damaging on soils, such as Hayesville and Braddock soils, that have a clayey subsoil. Deep plowing using large tractors and plows can complete the mixing of the subsoil and the surface layer. The higher the content of clay in the surface layer, the more difficult the soil is to till and the more difficult seed germination becomes. Erosion results in sedimentation of streams and reservoirs. Control of erosion minimizes pollution caused by sediments and improves the quality of water for municipal uses, for recreation, and for fish and wildlife. Trout streams are especially sensitive to environmental damage caused by sedimentation.

A resource management system provides a protective surface cover, helps to control runoff, and increases the rate of water infiltration. Improved cropping systems, conservation tillage, use of crop residue, terraces, stripcropping, grassed waterways, contour farming, and field borders help to control erosion. Assistance regarding the design and layout of erosion-control measures is available from the local office of the Natural Resources Conservation Service.

Tilth is an important factor affecting the germination of seeds and the infiltration of water into soil. Soils that have good tilth are granular and porous.

Some of the soils used for cropland in the county have a low content of organic matter (0 to 1 percent) in the surface layer. Intense rainfall results in crusting on some of these soils. The crust that forms is almost impervious to water. It reduces the rate of water infiltration and increases the rate of runoff. Regular additions of crop residue, manure, and other organic material to the soil improve soil structure and reduce crusting and thus increase the rate of water infiltration. A good content of organic matter ranges from 1.5 to 5 percent. Soils that have a higher content of clay, such as Hayesville and Braddock soils, form clods if cultivated when wet.

Drainage is a management concern in areas of the Iotla soils that are used for row crops or pasture. Yields can be increased in areas of these soils by installing a surface and subsurface drainage system.

Federal and State regulations require that any area designated as wetlands cannot be altered without prior approval. Contact the local office of the Natural Resources Conservation Service for identification of hydric soils and potential wetlands.

Forage Production

Most of the soils in McDowell County are moderately suited to the grasses and legumes commonly grown in the county. Examples are tall fescue, orchardgrass, alfalfa, ladino clover, and red clover. Yield and quality vary between soils. Steep slopes and stones on and in the soil can be severe limitations affecting the establishment and maintenance of forage plants. The relative suitability of each soil is described in the section "Detailed Soil Map Units."

Most of the soils in the county are low in natural fertility. Applications of fertilizer and lime are needed. Calcium and phosphorus in particular are needed. The amount and kind of fertilizer and lime to be applied should be based on the results of soil tests, on the kind of forage to be grown, and on the desired yield. Lime and phosphorus should be incorporated into a well prepared seedbed before planting. Where lime and fertilizer are not required, no-till seeding is effective. Fertility levels should be maintained by annual topdress applications after the sod has been established. Maximum yields are obtained if fertilizer is applied to cool season plants, such as fescue, orchardgrass, and clover, in spring and fall immediately before the growing season.

In older pastures, a higher quantity of better quality

forage can be obtained by eliminating the lower yielding species and establishing a desirable grass-clover mixture. In the steeper areas, renovating in contour strips or by using no-till techniques reduces the extent of erosion. Introducing clover into a desirable grass sod greatly improves the quality of forage, reduces fescue toxicity problems, and reduces the amount of nitrogen fertilizer required.

Rotational grazing by use of cross fencing is needed to prevent overgrazing or undergrazing. Grazing that reduces the height of the forage to less than three inches greatly reduces forage production of most species. Undergrazing reduces feeding value, wastes forage, and promotes diseases and insects. Mowing helps to control uneven growth, to control weeds, and to keep plants at their most nutritious stage.

Access roads should be installed on the contour to help to control erosion and to aid in the application of fertilizer and in management.

Chemical Weed Control

The use of herbicides for weed control is a common practice on the cropland in McDowell County. It decreases the need for tillage and is an integral part of modern farming. Selected soil properties, such as organic matter content and texture of the surface layer, affect the rate of herbicide application. Estimates of both of these properties were determined for the soils in the county. Table 14 shows a general range of organic matter content in the surface layer of the soils. The texture of the surface layer is shown in the USDA texture column in table 13.

In some areas the organic matter content projected for the different soils is outside the range shown in the table. The content can be higher in soils that have received high amounts of animal or manmade waste. Soils that have recently been brought into cultivation may have a higher content of organic matter in the surface layer than similar soils that have been cultivated for a long time. Conservation tillage can increase the content of organic matter in the surface layer. A lower content of organic matter is common where the surface layer has been partly or completely removed by erosion or land smoothing. Current soil tests should be used for specific organic matter content determinations.

Soil Fertility

The soils in McDowell County generally are low in natural fertility. They are naturally acid. Additions of lime and fertilizer are needed for the production of most kinds of crops. Rosman, Colvard, and Iotla soils, however, are somewhat fertile because they formed in recent alluvium.

Liming requirements are a major concern on cropland. The acidity level in the soil affects the availability of many nutrients to plants and the activity of beneficial bacteria. Lime also neutralizes exchangeable aluminum in the soil and thus counteracts the adverse effects of high levels of aluminum on many crops. Liming adds calcium (from calcitic lime) or calcium and magnesium (from dolomitic lime) to the soil.

A soil test is a guide to what amount and kind of lime should be used. The desired pH levels may differ, depending on the soil properties and the crop to be grown.

Nitrogen fertilizer is required for most crops. It is generally not required, however, for peanuts and clover, in some rotations of soybeans, or for alfalfa that is established. A reliable soil test is not available for predicting nitrogen requirements. Appropriate rates of nitrogen application are described in the section "Yields per Acre."

Soil tests can indicate the need for phosphorus and potassium fertilizer. They are needed because phosphorus and potassium tend to build up in the soil. The content of these nutrients varies between areas of the same kind of soil because of past management practices.

Yields per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 5. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. The land capability classification also is shown in the table.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

A high level of management includes maintaining proper soil reaction and fertility levels as indicated by standard soil tests. The application rate of nitrogen for corn on soils that have a yield potential of 125 to 150

bushels per acre should be 140 to 160 pounds per acre. If the yield potential for corn is 100 bushels per acre or less, a rate of 100 to 120 pounds of nitrogen per acre should be used. The application of nitrogen in excess of that required for potential yields generally is not recommended. The excess nitrogen fertilizer that is not utilized by the crop is an unnecessary expense and causes a hazard of water pollution. If corn or cotton is grown after the harvest of soybeans or peanuts, nitrogen rates can be reduced by about 20 to 30 pounds per acre. Because nitrogen can be readily leached from sandy soils, applications may be needed on these soils more than once during the growing season.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 5 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Natural Resources Conservation Service or of the North Carolina Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for use as cropland *(15)*. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for woodland or for engineering purposes.

In the capability system, soils are generally grouped at three levels—capability class, subclass, and unit. Only class and subclass are used in this survey.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode, but they have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, IIe. The letter *e* shows that the main hazard is the risk of erosion unless a close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w, s,* or *c* because the soils in class V are subject to little or no erosion. They have other limitations that restrict their use to pasture, woodland, wildlife habitat, or recreation.

The capability classification of each map unit component is given in the section "Detailed Soil Map Units" and in table 5.

Woodland Management and Productivity

James H. Ware, forester, Natural Resources Conservation Service, and Alan R. Colwell, supervisory forester, and John T. Blanton, district silviculturist, Forest Service, helped prepare this section.

Forest managers in McDowell County are faced with the challenge of producing greater yields from smaller areas. Meeting this challenge requires intensive management and silvicultural practices. Many modern silvicultural techniques resemble those long practiced in agriculture. They include establishing, weeding, and thinning a desirable young stand; propagating the more productive species and genetic varieties; providing short rotations and complete fiber utilization; controlling

insects, diseases, and weeds; and improving tree growth by applications of fertilizer and the installation of a drainage system. Even though timber crops require decades to grow, the goal of intensive management is similar to the goal of intensive agriculture. This goal is to produce the greatest yield of the most valuable crop as quickly as possible.

Commercial forests cover 229,681 acres, or about 81 percent of the land area of McDowell County *(14)*. Commercial forest is land that is producing or is capable of producing crops of industrial wood and that has not been withdrawn from timber production. Eastern white pine, loblolly pine, and yellow-poplar are the most important timber species in the county because they are fast growing, are adapted to the soil and climate, bring the highest average sale value per acre, and are easy to establish and manage.

White oak and northern red oak, which grow slower than eastern white pine, loblolly pine, or yellow-poplar, are important timber species on National Forest land. The Forest Service manages hardwoods on existing quality hardwood sites.

For purposes of forest inventory, the predominant forest types identified in McDowell County are described in the following paragraphs *(14)*.

Eastern white pine-hemlock. This forest type covers 9,598 acres. It is more than 50 percent eastern white pine and eastern hemlock. Commonly included trees are sweet birch, yellow birch, red maple, and yellow-poplar.

Loblolly-shortleaf pine. This forest type covers 27,012 acres. It is more than 50 percent pitch pine, Virginia pine, or other kinds of southern yellow pine. Loblolly pine is not native to McDowell County but has been planted in many places. Commonly included trees are red oak, white oak, gum, hickory, and yellow-poplar.

Oak-pine. This forest type covers 27,903 acres. It is more than 50 percent hardwoods, usually oaks. Pines make up 25 to 50 percent of the stand. Commonly included trees are yellow-poplar, gum, and hickory.

Oak-hickory. This forest type covers 160,369 acres. It is more than 50 percent upland oaks and hickory. Commonly included trees are red maple and yellow-poplar.

Elm-ash-cottonwood. This forest type covers 4,799 acres. It is more than 50 percent American sycamore, green ash, and yellow-poplar. Commonly included trees are red maple, river birch, and black willow.

If left undisturbed, the oak-pine forest type and the loblolly-shortleaf pine forest type develop into a forest of predominantly oak and other upland hardwoods. The understory usually consists of hardwood seedlings and saplings, which are more tolerant of shade than pine seedlings and saplings. In a shaded understory, hardwoods compete for light and moisture so strongly that few pine seedlings are able to survive.

One of the first steps in planning intensive woodland management is to determine the potential productivity of the soil for several alternative tree species. The most productive and valued trees are then selected for each soil type. Site and yield information enables a forest manager to estimate future wood supplies. These estimates are the basis of realistic decisions concerning expenses and profits associated with intensive woodland management, land acquisition, or industrial investments.

The potential productivity of woodland depends on physiography, soil properties, climate, and the effects of past management. Specific soil properties and site characteristics, including soil depth, texture, structure, and depth to the water table, affect forest productivity primarily by influencing available water capacity, aeration, and root development. The net effects of the interaction of these soil properties and site characteristics determine the potential site productivity.

Other site factors also are important. The gradient and length of slopes affect water movement and availability. In mountainous areas, elevation and aspect affect the amount of sunlight a site receives and the rate of evaporation. Sites on south-facing slopes are warmer and drier than those on north-facing slopes. The best sites are generally on north- and east-facing slopes in the lower areas, in sheltered coves, and in gently sloping concave areas. The amount of rainfall and length of growing season influence site productivity. In McDowell County, the amount of rainfall increases with elevation and the length of the growing season decreases. Trees are commonly damaged by ice and high winds on the ridges at elevations above 4,000 feet.

Thinning is important to ensure that the best trees have room to grow. Diseased, poorly formed, and slow growing trees can be harvested. Pine plantations and stands of yellow-poplar in coves are occasionally thinned in the county. Stands of hardwoods are not commonly thinned, but they could be if markets for firewood further develop. Harvesting firewood on cutover sites may reduce reforestation costs.

Erosion-control measures are important during and after logging. Cutting trees does not cause erosion, but erosion occurs on access roads and skid trails and in loading areas and other areas where the surface litter has been removed. Filter strips or vegetated areas between logged areas and streams help filter sediments from the site. Roads and skid paths should not be laid out across a stream. If crossing a stream is unavoidable, culverts or log bridges should be installed. Roads and trails should be laid out on the contour. Water bars, culverts, broad-based dips, and out-sloping

roads reduce the hazard of erosion. Road grades should be less than 10 percent.

In exposed areas applying fertilizer and seeding help to control erosion. Specialized logging practices, such as cable logging or helicopter logging, reduce the hazard of erosion and eliminate the need for skid trails and for many logging roads. The Forest Service uses cable logging in areas where the slope is more than 40 percent.

Operating logging equipment only during dry periods reduces the hazard of soil compaction and the extent of damage to tree roots. Controlling plant competition is important. Properly preparing a site, prescribed burning, spraying, cutting, and girdling help to control competing vegetation.

This soil survey can be used by woodland managers planning ways to increase the productivity of forest land. Some soils respond better to applications of fertilizer than others, and some are more susceptible to landslides and erosion after roads are built and timber is harvested. Some soils require special reforestation efforts. In the section "Detailed Soil Map Units," the description of each map unit in the survey area suitable for timber includes information about productivity, limitations in harvesting timber, and management concerns in producing timber. The common forest understory plants also are listed. Table 6 summarizes this forestry information and rates the soils for a number of factors to be considered in management. *Slight, moderate,* and *severe* are used to indicate the degree of the major soil limitations to be considered in forest management.

Table 6 lists the *ordination symbol* for each soil. The first part of the ordination symbol, a number, indicates the potential productivity of a soil for the indicator species in cubic meters per hectare. The larger the number, the greater the potential productivity. Potential productivity is based on the site index and the point where mean annual increment is the greatest.

The second part of the ordination symbol, a letter, indicates the major kind of soil limitation affecting use and management. The letter *R* indicates a soil that has a significant limitation because of the slope. The letter *X* indicates that a soil has restrictions because of stones or rocks on the surface. The letter *W* indicates a soil in which excessive water, either seasonal or year-round, causes a significant limitation. The letter *T* indicates a soil that has, within the root zone, excessive alkalinity or acidity, sodium salts, or other toxic substances that limit the development of desirable trees. The letter *D* indicates a soil that has a limitation because of a restricted rooting depth, such as a shallow soil that is underlain by hard bedrock, a hardpan, or other layers that restrict roots. The letter *C* indicates a soil that has a limitation because of the kind or amount of clay in the upper part of the profile. The letter *S* indicates a dry, sandy soil. The letter *F* indicates a soil that has a large amount of coarse fragments. The letter *A* indicates a soil having no significant limitations that affect forest use and management. If a soil has more than one limitation, the priority is as follows: R, X, W, T, D, C, S, and F.

Ratings of the *erosion hazard* indicate the probability that damage may occur if site preparation or harvesting activities expose the soil. The risk is *slight* if no particular preventive measures are needed under ordinary conditions; *moderate* if erosion-control measures are needed for particular silvicultural activities; and *severe* if special precautions are needed to control erosion for most silvicultural activities. Ratings of moderate or severe indicate the need for construction of higher standard roads, additional maintenance of roads, additional care in planning harvesting and reforestation activities, or the use of special equipment.

Ratings of *equipment limitation* indicate limits on the use of forest management equipment, year-round or seasonal, because of such soil characteristics as slope, wetness, stoniness, and susceptibility of the surface layer to compaction. As slope gradient and length increase, the use of wheeled equipment becomes more difficult. On the steeper slopes, tracked equipment is needed. On the steepest slopes, even tracked equipment cannot be operated and more sophisticated systems are needed. The rating is *slight* if equipment use is restricted by wetness for less than 2 months and if special equipment is not needed. The rating is *moderate* if slopes are so steep that wheeled equipment cannot be operated safely across the slope, if wetness restricts equipment use from 2 to 6 months per year, if stoniness restricts the use of ground-based equipment, or if special equipment is needed to prevent or minimize compaction. The rating is *severe* if slopes are so steep that tracked equipment cannot be operated safely across the slope, if wetness restricts equipment use for more than 6 months per year, if stoniness restricts the use of ground-based equipment, or if special equipment is needed to prevent or minimize compaction. Ratings of moderate or severe indicate a need to choose the best suited equipment and to carefully plan the timing of harvesting and other management activities.

Ratings of *seedling mortality* refer to the probability of the death of the naturally occurring or properly planted seedlings of good stock in periods of normal rainfall, as influenced by kinds of soil or topographic features. Seedling mortality is caused primarily by too much water or too little water. The factors used in rating a soil for seedling mortality are texture of the surface layer, depth to a seasonal high water table and the length of

the period when the water table is high, rock fragments in the surface layer, rooting depth, and the aspect of the slope. The mortality rate generally is highest on soils that have a sandy or clayey surface layer. The risk is *slight* if, after site preparation, expected mortality is less than 25 percent; *moderate* if expected mortality is between 25 and 50 percent; and *severe* if expected mortality exceeds 50 percent. Ratings of moderate or severe indicate that it may be necessary to use containerized or larger than usual planting stock or to make special site preparations, such as bedding, furrowing, installing a surface drainage system, and providing artificial shade for seedlings. Reinforcement planting is often needed if the risk is moderate or severe.

Ratings of *windthrow hazard* indicate the likelihood that trees will be uprooted by the wind. A restricted rooting depth is the main reason for windthrow. The rooting depth can be restricted by a high water table, a fragipan, or bedrock or by a combination of such factors as wetness, texture, structure, and depth. The risk is *slight* if strong winds break trees but do not uproot them; *moderate* if strong winds blow a few trees over and break many trees; and *severe* if moderate or strong winds commonly blow trees over. Ratings of moderate or severe indicate that care is needed in thinning or that the stand should not be thinned at all. Special equipment may be needed to prevent damage to shallow root systems in partial cutting operations. A plan for the periodic removal of windthrown trees and for the maintenance of a road and trail system may be needed.

The *potential productivity* of *common trees* on a soil is expressed as a *site index* and a *volume* number. Common trees are listed in table 6 in the order of their observed general occurrence. The table generally lists four to six trees for each applicable map unit. Additional species that commonly occur on the soils may be listed in the detailed soil map unit descriptions. Generally, only two or three tree species dominate. The first tree listed for each soil is the indicator species for that soil. An indicator species is a tree that is common in the area and that is generally the most productive on a given soil.

For soils that are commonly used for timber production, the yield is predicted in cubic feet per acre per year. It is predicted at the point where mean annual increment culminates. The estimates of the productivity of the soils in this survey are based mainly on chestnut oak, northern red oak, and yellow-poplar *(3, 12)*.

The *site index* is determined by taking height measurements and determining the age of selected trees within stands of a given species. This index is the average height, in feet, that the trees attain in a specified number of years (50 years in this survey). This index applies to fully stocked, even-aged, unmanaged stands. Productivity of a site can be improved through management practices, such as applying fertilizer and planting genetically improved species.

The site index values listed in table 6 are based on measurements at selected sites in McDowell County and other counties and are used in conjunction with published site index curves *(3, 4, 6, 7, 8, 11, 12)*.

The *volume* is the yield likely to be produced by the most important trees, expressed in cubic feet per acre per year.

Trees to plant are those that are used for reforestation or, under suitable conditions, natural regeneration. They are moderately suited to the soils and can produce a commercial wood crop. The desired product, topographic position (such as a low, wet area), and personal preference are three factors among many that can influence the choice of trees for use in reforestation. If hardwoods are desired on a forest site, natural reproduction from seeds and sprouts of acceptable species is effective. Special site preparation techniques may be needed.

Recreation

A variety of recreational opportunities are available in McDowell County. Parks and playgrounds, campgrounds, swimming facilities, paths and trails, areas suitable for horseback riding, two golf courses, and a variety of game animals are in the county. Lake James and the Catawba River provide opportunities for freshwater fishing and boating. Numerous small streams flowing out of the mountains offer excellent trout fishing. The Blue Ridge Parkway, which forms the northern border of the county, offers spectacular scenery (fig. 8).

In table 7, the soils of the survey area are rated according to the limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation also are important. Soils subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the

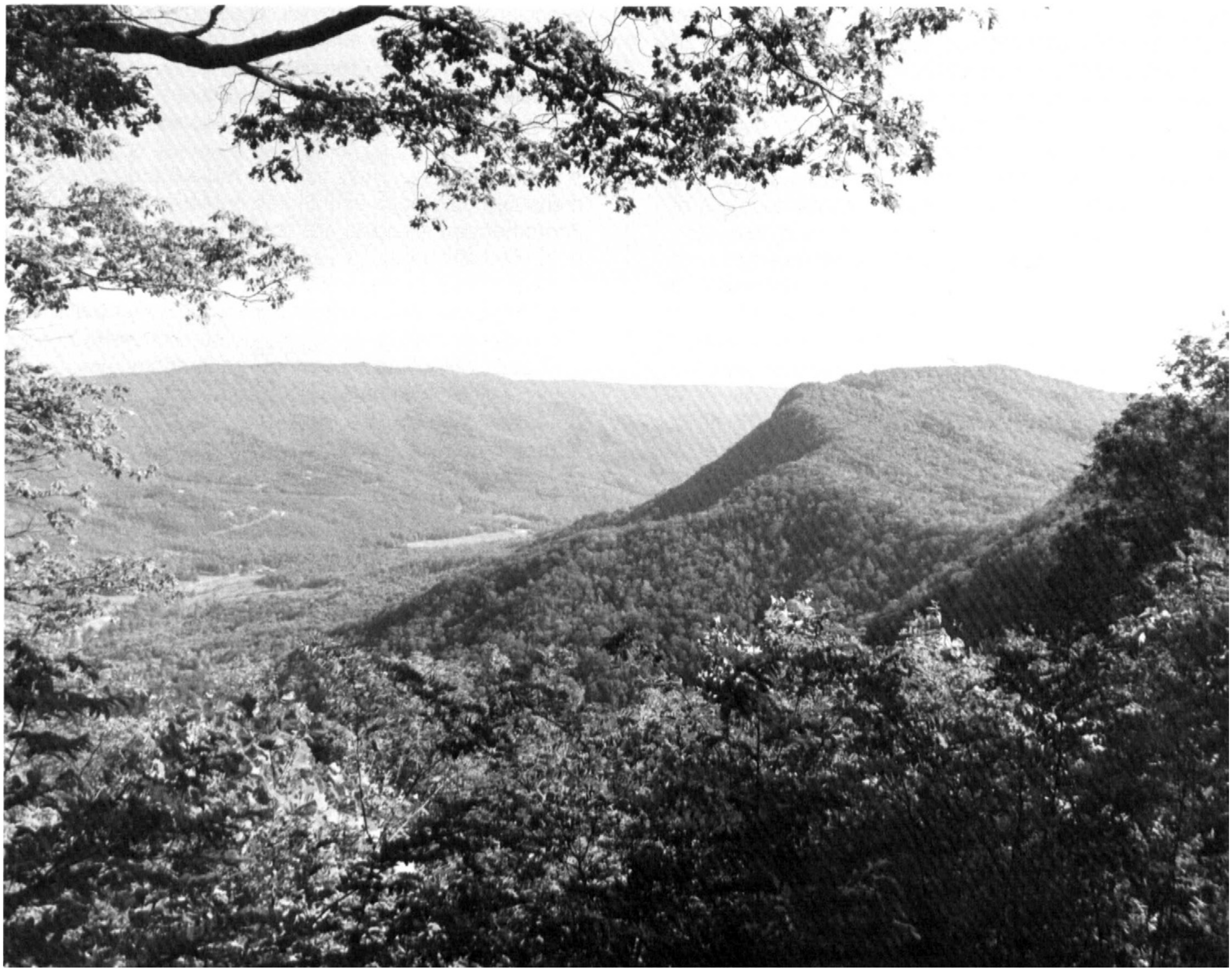

Figure 8.—Mountain scenery along the Blue Ridge Parkway.

height, duration, intensity, and frequency of flooding is essential.

In table 7, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 7 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 10 and interpretations for dwellings without basements and for local roads and streets in table 9.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have gentle slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes

and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes, stones, or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock should be considered.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

John P. Edwards, biologist, Natural Resources Conservation Service, helped prepare this section.

McDowell County has habitat suitable for many kinds of wildlife. Deer, mourning dove, rabbit, fox, squirrel, bear, chipmunk, waterfowl, opossum, quail, raccoon, groundhog, grouse, bobcat, numerous nongame birds, and fish are among the most important kinds of wildlife in the county.

Improving habitat can increase the abundance of wildlife. For example, field borders and hedgerows, which are not suitable for cultivation, can provide food and cover for wildlife. The need for habitat management should be considered in planning land use patterns.

Management for woodland wildlife habitat and for edge habitat can be especially productive. Plantings to increase food supplies and the creation or management of openings to increase edge habitat are particularly effective. Managing pasture so that it can also be used by wildlife can produce favorable results.

Lake James, the Catawba River, and the small streams and numerous farm ponds in the county provide nesting sites for wood ducks. Mallards, black ducks, and other migratory waterfowl use these areas during winter.

Fish in streams benefit greatly from erosion-control measures, such as fencing that prevents cattle from using the banks of the stream and tree planting that increases the quality of the plant cover along the stream. Establishing a plant cover on critically eroding streambanks reduces sedimentation.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 8, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat. The ratings given in the table are intended to be used as a guide and are not site specific. Onsite investigation is needed for individual management plans.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer,

available water capacity, wetness, slope, surface stoniness, and flooding. Soil temperature and soil moisture also are considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flooding, and slope. Soil temperature and soil moisture also are considerations. Examples of grasses and legumes are fescue, lovegrass, bromegrass, clover, orchardgrass, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flooding. Soil temperature and soil moisture also are considerations. Examples of wild herbaceous plants are bluestem, goldenrod, beggarweed, and pokeberry.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwoods and shrubs are depth of the root zone, available water capacity, and wetness. Examples of these plants are oak, poplar, cherry, sweetgum, apple, hawthorn, dogwood, hickory, blackberry, and blueberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are autumn-olive and crabapple.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are eastern white pine, assorted yellow pines, red spruce, Fraser fir, hemlock, and cedar.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, slope, and surface stoniness. Examples of wetland plants are smartweed, cattail, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. Wildlife attracted to these areas include bobwhite quail, meadowlark, field sparrow, cottontail rabbit, and red fox.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, ruffed grouse, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, white-tailed deer, cottontail rabbit, and black bear.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, and mink.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, sanitary facilities, construction materials, and water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution,

liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kinds of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, the shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Table 9 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock or a very firm dense layer, stone content, soil texture, and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and depth to the water table.

Dwellings and *small commercial buildings* are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, and shrinking and swelling can cause the movement of footings. The depth to a high water table, depth to bedrock, large stones, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 or 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or stabilized soil material; and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. The depth to bedrock, depth to a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), the shrink-swell potential, and depth to a high water table affect the traffic-supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, depth to a high water table, depth to bedrock, and the available water capacity in the upper 40 inches affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established. Soil tests are essential to determine liming and fertilizer needs. Help in making soil tests or in deciding what soil additive, if any, should be used can be obtained from the office of the McDowell County Soil and Water Conservation District or the local office of the North Carolina Cooperative Extension Service.

Sanitary Facilities

Table 10 shows the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 10 also shows the suitability of the soils for use as daily cover for landfill. A rating of *good* indicates that soil properties and site features are favorable for the use and that good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, depth to a high water table, depth to bedrock, and flooding affect absorption of the effluent. Large stones and bedrock interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness. Detailed information concerning the installation of septic systems can be obtained from the McDowell County Health Department.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Aerobic lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water. The animal waste lagoons commonly used in farming operations are not considered in the ratings. They are generally deeper than the lagoons referred to in the table and rely on anaerobic bacteria to decompose waste materials.

Table 10 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, depth to a high water table, depth to bedrock, flooding, large stones, and content of organic matter.

Excessive seepage resulting from rapid permeability in the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope or bedrock can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground-water pollution. Ease of excavation and revegetation should be considered.

The ratings in table 10 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock, depth to a water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, and soil reaction affect trench landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area sanitary landfill. The soil material may be obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 11 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help to determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, depth to a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and the shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, a low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* have more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have a moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet and have a water table at a depth of less than 1 foot. These soils have layers of suitable material, but the material is less than 3 feet thick.

Sand and *gravel* are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In table 11, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is as much as 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as gneiss and schist, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, depth to a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, depth to a water table, rock fragments, and depth to bedrock.

Soils rated *good* have friable, loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are naturally fertile or

respond well to fertilizer and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel or stones, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel or stones, have slopes of more than 15 percent, or have a seasonal high water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and releases a variety of plant nutrients as it decomposes.

Water Management

Table 12 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed excavated ponds. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives the restrictive features that affect each soil for drainage, irrigation, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability in the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area. Ponds that are less than about 2 acres in size are not shown on the soil maps because of the scale of mapping.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or mica. The depth to a high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table and permeability in the aquifer. The depth to bedrock and the content of large stones affect the ease of excavation.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock or to other layers that affect the rate of water movement, permeability, depth to a high water table or depth of standing water if the soil is subject to ponding, slope, and susceptibility to flooding. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity. Availability of drainage outlets is not considered in the ratings.

Federal and State regulations require that any area designated as wetlands cannot be altered without prior approval. Contact the local office of the Natural Resources Conservation Service for identification of hydric soils and potential wetlands.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock. The performance of a system is affected by the availability of suitable irrigation water, the depth of the root zone, and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to help to control erosion and conserve

moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock affect the construction of terraces and diversions. Maintenance of terraces and diversions is adversely affected by a restricted rooting depth, water erosion, an excessively coarse texture, and restricted permeability.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock affect the construction of grassed waterways. Low available water capacity, restricted rooting depth, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed *(13)*. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics. These results are reported in table 16.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classification, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 13 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under the heading "Soil Series and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages, by weight, of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as 15 percent, by volume, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system *(2)* and the system adopted by the American Association of State Highway and Transportation Officials *(1)*.

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, SP-SM.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20, or higher, for the poorest. The AASHTO classification for soils tested, with group index numbers in parentheses, is given in table 16.

Rock fragments larger than 3 inches in diameter are indicated as a percentage of the total soil on a dry-

weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

Physical and Chemical Properties

Table 14 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate, or component, consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated content of clay in each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence the shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at ⅓-bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of movement of water through the soil when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage in each major soil layer is stated in inches of water per inch of soil. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time. It is the difference between the amount of soil water at field moisture capacity and the amount at wilting point.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

The shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, more than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE)

to predict the average annual rate of soil loss by sheet and rill erosion. Losses are expressed in tons per acre per year. These estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.02 to 0.69. The higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur over a sustained period without affecting crop productivity. The rate is expressed in tons per acre per year.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 14, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Table 15 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils are assigned to one of four groups. They are grouped according to the infiltration of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep or very deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding, the temporary covering of the surface by flowing water, is caused by overflowing streams and by runoff from adjacent slopes. Shallow water standing or flowing for short periods after rainfall or snowmelt is not considered flooding. Standing water in swamps and marshes or in a closed depression is considered ponding.

Table 15 gives the frequency and duration of flooding. Frequency and duration of flooding are estimated. Frequency generally is expressed as *none, rare, occasional,* or *frequent. None* means that flooding is not probable. *Rare* means that flooding is unlikely but possible under unusual weather conditions (the chance of flooding is nearly 0 percent to 5 percent in any year). *Occasional* means that flooding occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year). *Frequent* means that flooding occurs often under normal weather conditions (the chance of flooding is more than 50 percent in any year). Duration is expressed as *very brief* (less than 2 days), *brief* (2 to 7 days), *long* (7 days to 1 month), and *very long* (more than 1 month). About two-thirds to three-fourths of all flooding occurs during the stated period.

The information on flooding is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered is local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 15 are depth to the seasonal high water table, the kind of water table, and the months of the year that the water table commonly is highest. A water table that is seasonally high for less than 1 month is not indicated in table 15. An apparent water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil.

Two numbers in the column showing depth to the

water table indicate the normal range in depth to a saturated zone. Depth is given to the nearest half foot. The first numeral in the range indicates the highest water level. "More than 6.0" indicates that the water table is below a depth of 6 feet.

Depth to bedrock is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is specified as either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low, moderate,* or *high,* is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion also is expressed as *low, moderate,* or *high.* It is based on soil texture, acidity, and the amount of sulfates in the saturation extract.

Engineering Index Test Data

Table 16 shows laboratory test data for several pedons sampled at carefully selected sites in the survey area. The pedons are typical of the series and are described in the section "Soil Series and Their Morphology." The soil samples were tested by the North Carolina Department of Transportation and Highway Safety, Materials and Test Unit, Raleigh, North Carolina.

The testing methods generally are those of the American Association of State Highway and Transportation Officials (AASHTO) or the American Society for Testing and Materials (ASTM).

The tests and methods are AASHTO classification—M 145 (AASHTO), D 3282 (ASTM); Unified classification—D 2487 (ASTM); Mechanical analysis—T 88 (AASHTO), D 422 (ASTM), D 2217 (ASTM); Liquid limit—T 89 (AASHTO), D 4318 (ASTM); Plasticity index—T 90 (AASHTO), D 4318 (ASTM); and Moisture density—T 99 (AASHTO), D 698 (ASTM).

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories *(16)*. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or on laboratory measurements. Table 17 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Eleven soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Ultisol.

SUBORDER. Each order is divided into suborders, primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Udult (*Ud*, meaning moist but not wet, plus *ult*, from Ultisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Hapludult (*Hapl*, meaning minimal horizonation, plus *udult*, the suborder of the Ultisols that has a udic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Hapludults.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-loamy, mixed, mesic Typic Hapludults.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. There can be some variation in the texture of the surface layer or of the substratum within a series. The Brasstown series is an example of fine-loamy, mixed, mesic Typic Hapludults.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The location of the typical pedon is described, and the exact location is shown on the detailed soil maps with a special symbol. The detailed description of each soil horizon follows standards in the "Soil Survey Manual" *(17)*. Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" *(16)*. Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

Ashe Series

The Ashe series consists of moderately deep, somewhat excessively drained soils that formed in

residuum weathered from gneiss or schist. These soils are on low and intermediate mountain ridgetops and side slopes. Slopes range from 10 to 95 percent. The soils are coarse-loamy, mixed, mesic Typic Dystrochrepts.

Typical pedon of Ashe gravelly sandy loam, in an area of Chestnut-Ashe complex, 25 to 80 percent slopes, stony; in a forest near Sunny Vale, about 1.0 mile west on Secondary Road 1437 from its intersection with North Carolina Highway 80, about 100 feet north of the road:

Oi—1 inch to 0; slightly decomposed forest litter.

A1—0 to 3 inches; dark brown (10YR 3/3) gravelly sandy loam; weak medium granular structure; very friable; many fine and medium roots; about 20 percent, by volume, rock fragments; few flakes of mica; very strongly acid; abrupt smooth boundary.

A2—3 to 7 inches; yellowish brown (10YR 5/4) gravelly sandy loam; weak medium granular structure; very friable; many fine and medium roots; about 15 percent, by volume, rock fragments; few flakes of mica; very strongly acid; clear wavy boundary.

Bw—7 to 20 inches; yellowish brown (10YR 5/6) sandy loam; weak fine subangular blocky structure; friable; common fine and medium roots; about 10 percent, by volume, rock fragments; few flakes of mica; very strongly acid; clear wavy boundary.

C—20 to 24 inches; yellowish brown (10YR 5/4) saprolite that has a texture of sandy loam; massive; friable; about 10 percent, by volume, rock fragments; few flakes of mica; very strongly acid; abrupt wavy boundary.

Cr—24 to 30 inches; soft, weathered gneiss bedrock; partly consolidated but can be dug with difficulty by hand tools; gradual wavy boundary.

R—30 inches; hard, unweathered gneiss bedrock.

The depth to hard bedrock is 20 to 40 inches. The solum is 14 to 40 inches thick. The content of rock fragments ranges from 15 to 35 percent, by volume, in the A horizon and from 5 to 35 percent in the B and C horizons. Reaction ranges from very strongly acid to moderately acid, except where the surface layer has been limed. Few or common flakes of mica are throughout the soils.

The A horizon has hue of 10YR, value of 3 or 4, and chroma of 2 to 6. Where value is 3, the horizon is less than 7 inches thick.

The Bw horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8. It is loam, fine sandy loam, or sandy loam in the fine-earth fraction.

The C horizon is saprolite that has colors and textures similar to those of the Bw horizon.

The Cr horizon, if it occurs, is soft, weathered bedrock that is partly consolidated but can be dug with difficulty by hand tools.

The R horizon is hard, unweathered bedrock.

Biltmore Series

The Biltmore series consists of very deep, well drained and moderately well drained soils that formed in recent stream sediments on flood plains. Slopes range from 0 to 3 percent. The soils are mixed, mesic Typic Udipsamments.

Typical pedon of Biltmore loamy fine sand, 0 to 3 percent slopes, occasionally flooded; in an old field planted to sycamore trees, about 1.1 miles northeast of Greenlee on Secondary Road 1214 from its intersection with Secondary Road 1245, about 400 feet northeast of a railroad crossing, about 100 feet south of the Catawba River:

Ap—0 to 10 inches; dark yellowish brown (10YR 4/4) loamy fine sand; weak fine granular structure; very friable; common fine roots; few flakes of mica; strongly acid; abrupt smooth boundary.

C—10 to 44 inches; yellowish brown (10YR 5/6) loamy sand; massive; very friable; few fine roots; few flakes of mica; strongly acid; abrupt smooth boundary.

Ab—44 to 50 inches; dark yellowish brown (10YR 4/4) sandy loam; massive; very friable; few flakes of mica; strongly acid; abrupt smooth boundary.

C′—50 to 60 inches; stratified yellowish brown (10YR 5/6), dark yellowish brown (10YR 4/4), and light gray (10YR 6/1) sand; single grained; loose; few flakes of mica; strongly acid.

The sandy sediments are 40 to more than 60 inches deep over deposits of gravel and cobbles stratified with sandy and loamy material. The content of rock fragments ranges from 0 to 10 percent, by volume, throughout the 10- to 40-inch particle-size control section. Few or common flakes of mica are throughout the control section. Reaction ranges from strongly acid to mildly alkaline.

The A horizon has hue of 10YR, value of 3 to 5, and chroma 2 to 4. Where value is 3, the horizon is less than 7 inches thick.

The C horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 3 to 8. The C′ horizon has hue of 7.5YR or 10YR, value of 4 to 7, and chroma of 1 to 6. To a depth of at least 40 inches, the C horizon is dominantly sand, loamy sand, or loamy fine sand. In some pedons, however, it has thin strata of sandy loam, loam, or silt loam. These strata make up less than 6 inches of the 10- to 40-inch control section. In some pedons the part of the profile below a depth of 40

inches has deposits of cobbles and gravel stratified with sandy and loamy sediments.

The Ab horizon has hue of 10YR, value of 3 to 5, and chroma 2 to 4. It is loam, fine sandy loam, or sandy loam.

Braddock Series

The Braddock series consists of very deep, well drained soils that formed in old stream sediments. These soils are on high stream terraces, foot slopes, and colluvial fans. Slopes range from 2 to 25 percent. The soils are clayey, mixed, mesic Typic Hapludults.

Typical pedon of Braddock clay loam, 2 to 6 percent slopes, eroded; near Marion, about 0.6 mile north on Secondary Road 1500 from its intersection with U.S. Highway 70, about 2.3 miles north on Secondary Road 1501, about 400 feet south of the Catawba River, in a road cut on the east side of the road:

Ap—0 to 7 inches; reddish brown (5YR 4/4) clay loam; weak medium granular structure; very friable; many fine and medium roots; strongly acid; clear smooth boundary.

Bt1—7 to 25 inches; red (2.5YR 4/6) clay; moderate medium subangular blocky structure; firm; common distinct clay films on faces of peds; common fine roots; strongly acid; gradual smooth boundary.

Bt2—25 to 46 inches; yellowish red (5YR 5/8) clay; common medium prominent brownish yellow (10YR 6/8) mottles; moderate medium subangular blocky structure; firm; common distinct clay films on faces of peds; few fine roots; strongly acid; clear smooth boundary.

Bt3—46 to 60 inches; yellowish red (5YR 5/8) gravelly clay loam; moderate medium subangular blocky structure; firm; few faint clay films on faces of peds; about 20 percent, by volume, rock fragments; strongly acid.

The predominantly clayey Bt horizon extends to a depth of 30 to more than 60 inches. The solum is 40 to more than 60 inches thick. The depth to hard bedrock is more than 5 feet. The thickness of the alluvium or colluvium ranges from 3 to more than 20 feet. The content of rock fragments ranges from 0 to 15 percent, by volume, in the A horizon and in the upper part of the B horizon and from 0 to 50 percent in the lower part of the B horizon and in the C horizon. The rock fragments consist mostly of waterworn pebbles and cobbles. Reaction is strongly acid or very strongly acid throughout the profile, except where the surface layer has been limed.

The A or Ap horizon has hue of 5YR to 10YR, value of 3 to 5, and chroma of 1 to 6. Where value is 3, the horizon is less than 6 inches thick.

The BA horizon, if it occurs, has hue of 2.5YR to 7.5YR, value of 4 or 5, and chroma of 4 to 8. It is loam, sandy clay loam, or clay loam.

The Bt horizon has hue of 10R to 5YR, value of 4 or 5, and chroma of 6 to 8. It is clay or clay loam in the fine-earth fraction. By weighted average, the content of clay is more than 35 percent in the upper 20 inches of this horizon.

The BC horizon, if it occurs, has the same colors as the Bt horizon. In some pedons it is mottled or streaked in shades of red, yellow, and brown. It is clay loam in the fine-earth fraction.

The C or 2C horizon, if it occurs, varies considerably in color and texture.

Brasstown Series

The Brasstown series consists of deep, well drained soils that formed in material weathered from quartzite or phyllite. These soils are on ridgetops and side slopes of low mountains. Slopes range from 6 to 60 percent. The soils are fine-loamy, mixed, mesic Typic Hapludults.

Typical pedon of Brasstown channery fine sandy loam, in an area of Junaluska-Brasstown complex, 6 to 25 percent slopes; in a forest about 1.0 mile south of Woodlawn on U.S. Highway 221 from its intersection with Secondary Road 1440, about 2,000 feet east on a Forest Service permanent access road to a helicopter pad, about 300 feet south on a logging road, in a road cut:

Oi—3 to 2 inches; forest litter.

Oe—2 inches to 0; partially decomposed leaf litter.

A—0 to 2 inches; yellowish brown (10YR 5/4) channery fine sandy loam; weak fine granular structure; friable; many fine, medium, and coarse roots; few fine flakes of mica; about 20 percent, by volume, rock fragments; very strongly acid; clear wavy boundary.

E—2 to 6 inches; yellowish brown (10YR 5/6) channery fine sandy loam; weak medium granular structure; friable; common fine, medium, and coarse roots; few fine flakes of mica; about 20 percent, by volume, rock fragments; very strongly acid; clear wavy boundary.

BE—6 to 9 inches; strong brown (7.5YR 5/8) loam; weak medium subangular blocky structure; friable; common fine and medium roots; few fine flakes of mica; very strongly acid; clear wavy boundary.

Bt1—9 to 19 inches; yellowish red (5YR 5/8) loam; moderate medium subangular blocky structure; friable; common fine and medium roots; few fine flakes of mica; very strongly acid; clear wavy boundary.

Bt2—19 to 30 inches; red (2.5YR 4/8) clay loam; moderate medium subangular blocky structure; friable; few fine and medium roots; few fine flakes of mica; very strongly acid; gradual wavy boundary.

BC—30 to 41 inches; yellowish red (5YR 5/8) very fine sandy loam; weak medium subangular blocky structure; friable; few fine and medium roots; few fine flakes of mica; very strongly acid; gradual wavy boundary.

C—41 to 50 inches; multicolored saprolite that has a texture of very fine sandy loam; massive; friable; few fine flakes of mica; very strongly acid; gradual wavy boundary.

Cr—50 to 60 inches; soft, weathered phyllite bedrock that is partly consolidated but can be dug with difficulty by hand tools.

The loamy horizons are 40 to 60 inches deep over soft bedrock. The solum is 30 to 50 inches thick. The depth to hard bedrock is more than 60 inches. The content of rock fragments ranges from 15 to 35 percent, by volume, in the A horizon and from 0 to 35 percent in the E, B, and C horizons. Few or common flakes of mica are throughout the soils. Reaction ranges from extremely acid to moderately acid, except where the surface layer has been limed.

The A horizon has hue of 10YR to 5YR, value of 3 to 5, and chroma of 3 to 8. Where value is 3, the horizon is less than 6 inches thick.

The E horizon, if it occurs, has hue of 5YR to 10YR, value of 4 to 6, and chroma of 3 to 8. It is fine sandy loam, very fine sandy loam, or loam in the fine-earth fraction.

The BA or BE horizon, if it occurs, has hue of 5YR or 7.5YR, value of 4 to 6, and chroma of 4 to 8. It is loam, fine sandy loam, very fine sandy loam, or sandy clay loam in the fine-earth fraction.

The Bt horizon has hue of 2.5YR to 7.5YR, value of 4 to 6, and chroma of 4 to 8. It is loam, sandy clay loam, or clay loam in the fine-earth fraction.

The BC horizon has colors and textures similar to those of the BA and BE horizons.

The C horizon is multicolored saprolite that has a texture of fine sandy loam, very fine sandy loam, or loam in the fine-earth fraction.

The Cr horizon is soft, weathered phyllite or quartzite bedrock that is partly consolidated but can be dug with difficulty by hand tools.

Chestnut Series

The Chestnut series consists of moderately deep, well drained soils that formed in material weathered from gneiss or schist. These soils are on low and intermediate mountain ridgetops and side slopes. Slopes range from 10 to 80 percent. The soils are coarse-loamy, mixed, mesic Typic Dystrochrepts.

Typical pedon of Chestnut gravelly sandy loam, in an area of Edneyville-Chestnut complex, 25 to 80 percent slopes, stony; in a forest near Ridge Crest, about 1.8 miles north of the Blue Ridge Assembly's recreation area, about 0.5 mile southeast of Buck Gap on the Old Toll Road, in a road cut:

Oi—1 inch to 0; slightly decomposed forest litter.

A—0 to 5 inches; brown (10YR 4/3) gravelly sandy loam; weak medium granular structure; friable; many fine roots; few fine flakes of mica; about 20 percent, by volume, rock fragments; strongly acid; abrupt wavy boundary.

Bw—5 to 35 inches; strong brown (7.5YR 5/6) sandy loam; weak medium subangular blocky structure; common medium roots; few fine flakes of mica; about 10 percent, by volume, rock fragments; very strongly acid; clear wavy boundary.

Cr—35 to 60 inches; soft, weathered gneiss bedrock; partly consolidated but can be dug with difficulty by hand tools.

The loamy horizons extend to a depth of 20 to 40 inches. The depth to soft bedrock is 20 to 40 inches. The solum is 15 to 39 inches thick. The content of rock fragments ranges from 15 to 35 percent, by volume, in the A horizon and from 5 to 35 percent in the B and C horizons. Few or common flakes of mica are throughout the soils. Reaction ranges from very strongly acid to moderately acid throughout the soils, except where the surface layer has been limed.

The A horizon has hue of 10YR or 7.5YR, value of 2 to 6, and chroma 2 to 4. Where value is 3 or less, the horizon is less than 7 inches thick.

The Bw horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 4 to 8. It is fine sandy loam, loam, or sandy loam in the fine-earth fraction.

The C horizon, if it occurs, has colors similar to those of the Bw horizon or is multicolored. It is saprolite weathered from gneiss or schist. It has a texture of sandy loam, loam, or fine sandy loam in the fine-earth fraction.

The Cr horizon is soft, weathered gneiss or schist bedrock that is partly consolidated but can be dug with difficulty by hand tools.

Cleveland Series

The Cleveland series consists of shallow, somewhat excessively drained soils that formed in material weathered from gneiss or schist. These soils are on the crests of low and intermediate mountain ridgetops and on side slopes. Slopes range from 60 to 95 percent.

The soils are loamy, mixed, mesic Lithic Dystrochrepts.

Typical pedon of Cleveland gravelly sandy loam, in an area of Ashe-Cleveland-Rock outcrop complex, 60 to 95 percent slopes; in a forest near the community of Linville Falls, about 3.3 miles southwest on the Blue Ridge Parkway from its intersection with U.S. Highway 221, about 200 feet north of the Chestoe View parking lot:

Oi—2 inches to 1 inch; hardwood litter.

Oe—1 inch to 0; partially decomposed leaf litter.

A—0 to 5 inches; dark grayish brown (10YR 4/2) gravelly sandy loam; weak fine granular structure; friable; many fine and medium roots; few fine flakes of mica; about 20 percent, by volume, rock fragments; moderately acid; clear wavy boundary.

Bw—5 to 17 inches; yellowish brown (10YR 5/4) gravelly sandy loam; weak medium subangular blocky structure; friable; common fine and medium roots; few fine flakes of mica; about 20 percent, by volume, rock fragments; moderately acid; abrupt irregular boundary.

R—17 inches; hard gneiss bedrock.

The loamy horizons are 10 to 20 inches deep over hard bedrock. The solum is 10 to 20 inches thick. The content of rock fragments ranges from 15 to 35 percent, by volume, in the A horizon and from 5 to 35 percent in the C horizon. Few or common flakes of mica are throughout the profile. Reaction ranges from very strongly acid to moderately acid.

The A horizon has hue of 10YR, value of 2 to 4, and chroma of 1 to 3. Where value is 3 or less, the horizon is less than 7 inches thick.

The Bw horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 3 or 4. It is loam, fine sandy loam, or sandy loam in the fine-earth fraction.

The C horizon, if it occurs, has colors and textures similar to those of the Bw horizon.

The R horizon is hard, unweathered gneiss or schist bedrock.

Colvard Series

The Colvard series consists of very deep, well drained soils that formed in recent stream sediments. These soils are on flood plains. Slopes range from 0 to 2 percent. The soils are coarse-loamy, mixed, nonacid, mesic Typic Udifluvents.

Typical pedon of Colvard loam, 0 to 2 percent slopes, occasionally flooded; about 1.0 mile southeast on North Carolina Highway 226 from its intersection with Interstate 40, about 0.8 mile south on Secondary Road 1794, about 0.2 mile east on Secondary Road 1796, about 200 feet northeast of the road, about 100 feet southeast of North Muddy Creek, in a field:

Ap—0 to 8 inches; brown (7.5YR 4/4) loam; weak medium granular structure; friable; common fine and medium roots; common fine flakes of mica; moderately acid; clear smooth boundary.

C1—8 to 27 inches; dark yellowish brown (10YR 4/4) loam; massive; friable; few fine roots; common fine flakes of mica; common bedding planes and thin strata of brownish yellow (10YR 6/6) loamy sand; strongly acid; abrupt wavy boundary.

C2—27 to 40 inches; dark yellowish brown (10YR 4/4) sandy loam; massive; friable; few fine roots; common fine flakes of mica; common bedding planes and thin strata of loam; moderately acid; clear wavy boundary.

C3—40 to 60 inches; pale brown (10YR 6/3) loamy sand; massive; very friable; few fine roots; common fine flakes of mica; few bedding planes and thin strata of brown loam; moderately acid.

The loamy sediments are 40 to more than 60 inches deep over deposits of stratified sandy, loamy, gravelly, or cobbly sediments. The content of rock fragments ranges from 0 to 15 percent, by volume, in the upper 40 inches. Few or common flakes of mica are throughout the profile. Reaction ranges from strongly acid to mildly alkaline.

The A horizon has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 2 to 4. Where value is 3, the horizon is less than 7 inches thick.

The C horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 6. It is dominantly sandy loam, fine sandy loam, or loam. Below a depth of 40 inches, however, it can consist of stratified sandy, loamy, cobbly, and gravelly sediments.

Cowee Series

The Cowee series consists of moderately deep, well drained soils that formed in material weathered from gneiss or schist. These soils are on narrow ridgetops and side slopes on the lower mountains and foothills. Slopes range from 25 to 60 percent. The soils are fine-loamy, mixed, mesic Typic Hapludults.

Typical pedon of Cowee loam, in a wooded area of Evard-Cowee complex, 25 to 60 percent slopes; about 3.0 miles east of Old Fort, about 0.2 mile east on U.S. Highway 70 from its intersection with Secondary Road 1231, about 150 feet south of the road:

Oi—1 inch to 0; slightly decomposed hardwood litter.

A—0 to 5 inches; brown (10YR 4/3) loam; weak fine

granular structure; very friable; many fine and medium roots; few fine flakes of mica; very strongly acid; clear wavy boundary.

Bt1—5 to 11 inches; strong brown (7.5YR 5/6) loam; moderate medium subangular blocky structure; friable; common medium and coarse roots; few fine flakes of mica; very strongly acid; gradual wavy boundary.

Bt2—11 to 26 inches; yellowish red (5YR 5/6) loam; moderate medium subangular blocky structure; friable; few fine roots; about 10 percent, by volume, cobbles; few fine flakes of mica; very strongly acid; clear wavy boundary.

Cr—26 to 60 inches; soft, weathered gneiss bedrock; partly consolidated but can be dug with difficulty by hand tools.

The loamy horizons are 20 to 40 inches deep over soft bedrock. The solum is 20 to 39 inches thick. The depth to hard bedrock is more than 40 inches. The content of rock fragments ranges from 0 to 15 percent, by volume, in the A horizon and from 0 to 35 percent in the B and C horizons. Reaction ranges from very strongly acid to moderately acid, except where the surface layer has been limed.

The A horizon has hue of 5YR to 10YR, value of 3 to 5, and chroma of 3 to 6. Where value is 3, the horizon is less than 6 inches thick.

The Bt horizon has hue of 2.5YR to 7.5YR, value of 4 to 6, and chroma of 4 to 8. It is loam, sandy clay loam, or clay loam in the fine-earth fraction.

The BC horizon, if it occurs, has colors similar to those of the Bt horizon. It is sandy loam, fine sandy loam, or loam in the fine-earth fraction.

The C horizon, if it occurs, is multicolored saprolite that has a texture of sandy loam, fine sandy loam, or loam in the fine-earth fraction.

The Cr horizon is soft, weathered gneiss or schist bedrock that can be dug with difficulty by hand tools.

Craggey Series

The Craggey series consists of shallow, somewhat excessively drained soils that formed in material weathered from gneiss. These soils are on high mountain side slopes and ridgetops. Slopes range from 40 to 90 percent. The soils are loamy, mixed, frigid Lithic Haplumbrepts.

Typical pedon of Craggey cobbly loam, in an area of Craggey-Rock outcrop complex, 40 to 90 percent slopes; in a forest near the Buncombe County line along the Blue Ridge Parkway, about 4,000 feet south of the Blue Ridge Parkway on the Old Toll Road, about 200 feet northwest of the road:

Oi—1 inch to 0; forest litter.

A—0 to 10 inches; very dark grayish brown (10YR 3/2) cobbly loam; weak medium granular structure; friable; many fine and medium roots; common fine flakes of mica; about 30 percent, by volume, stones, cobbles, and gravel; very strongly acid; abrupt wavy boundary.

Bw—10 to 16 inches; yellowish brown (10YR 5/6) cobbly loam; weak fine subangular blocky structure; friable; common fine and medium roots; common fine flakes of mica; about 30 percent, by volume, stones, cobbles, and gravel; very strongly acid; abrupt wavy boundary.

R—16 inches; hard, unweathered mica gneiss bedrock.

The loamy horizons are 10 to 20 inches deep over hard bedrock. The solum is 10 to 20 inches thick. The content of rock fragments ranges from 15 to 35 percent, by volume, in the A horizon and from 5 to 35 percent in the Bw horizon. Reaction ranges from very strongly acid to moderately acid.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2.

The Bw horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 6. It is loam, fine sandy loam, or sandy loam in the fine-earth fraction.

The R horizon is hard, unweathered gneiss bedrock.

Cullasaja Series

The Cullasaja series consists of very deep, well drained soils that formed in local alluvium and colluvium that moved downslope from areas underlain by gneiss or schist. These soils are on foot slopes, benches, and colluvial fans. Slopes range from 10 to 45 percent. The soils are loamy-skeletal, mixed, mesic Typic Haplumbrepts.

Typical pedon of Cullasaja very cobbly loam, in an area of Cullasaja-Tusquitee complex, 10 to 45 percent slopes; in a forest north of Old Fort, about 3.0 miles north on Curtis Creek Road from its intersection with Newberry Creek Road to Bear Drive Branch, about 0.5 mile up the creek, about 200 feet northeast of the creek:

Oi—½ inch to 0; slightly decomposed hardwood and hemlock litter.

A1—0 to 2 inches; very dark brown (10YR 2/2) very cobbly loam; weak medium granular structure; friable; many fine and medium roots; about 40 percent, by volume, stones, cobbles, and gravel; few fine flakes of mica; very strongly acid; clear wavy boundary.

A2—2 to 11 inches; very dark grayish brown (10YR 3/2) very cobbly loam; weak medium granular structure;

friable; many fine and medium roots; about 45 percent, by volume, stones, cobbles, and gravel; few fine flakes of mica; strongly acid; gradual wavy boundary.

Bw—11 to 30 inches; dark yellowish brown (10YR 4/6) very cobbly loam; weak medium subangular blocky structure; friable; common fine and medium roots; about 55 percent, by volume, stones, cobbles, and gravel; few fine flakes of mica; strongly acid; gradual wavy boundary.

C—30 to 63 inches; dark yellowish brown (10YR 4/6) very cobbly sandy loam; massive; friable; about 60 percent, by volume, stones, cobbles, and gravel; few fine flakes of mica; strongly acid.

The loamy horizons extend to a depth of 30 to more than 60 inches. The solum is 30 to 60 inches thick. The depth to bedrock is more than 72 inches. The content of rock fragments ranges from 35 to 70 percent, by volume, throughout the profile. Reaction is very strongly acid to moderately acid throughout the profile.

The A horizon has hue of 10YR and value and chroma of 2 or 3.

The Bw horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 4 to 6. It is very cobbly loam or very cobbly sandy loam.

The C horizon has colors and textures similar to those of the Bw horizon.

Dillard Series

The Dillard series consists of very deep, moderately well drained soils that formed in old stream sediments. These soils are on low stream terraces. Slopes range from 1 to 4 percent. The soils are fine-loamy, mixed, mesic Aquic Hapludults.

Typical pedon of Dillard loam, 1 to 4 percent slopes, rarely flooded; in a field near Pleasant Gardens, about 0.5 mile south on Secondary Road 1221 from its intersection with U.S. Highway 70, about 2.9 miles southwest on Secondary Road 1214, about 300 feet southeast of the road and the Southern Railroad line:

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) loam; weak medium granular structure; friable; common fine roots; few fine flakes of mica; neutral; abrupt wavy boundary.

BA—9 to 13 inches; yellowish brown (10YR 5/4) loam; weak medium subangular blocky structure; friable; common fine roots; few fine flakes of mica; strongly acid; abrupt wavy boundary.

Bt1—13 to 30 inches; yellowish brown (10YR 5/8) clay loam; many medium prominent brown (10YR 5/3) and pale brown (10YR 6/3) mottles; moderate medium subangular blocky structure; friable; few fine roots; common fine flakes of mica; strongly acid; clear wavy boundary.

Bt2—30 to 44 inches; yellowish brown (10YR 5/8) clay; many medium prominent light brownish gray (10YR 6/2) mottles; moderate medium subangular blocky structure; firm; common fine flakes of mica; strongly acid; gradual wavy boundary.

Bt3—44 to 48 inches; mottled yellowish brown (10YR 5/8) and light brownish gray (10YR 6/2) clay loam; weak medium subangular blocky structure; friable; common fine flakes of mica; strongly acid; clear wavy boundary.

Cg—48 to 60 inches; grayish brown (10YR 5/2) loam; many medium prominent yellowish brown (10YR 5/8) mottles; massive; friable; common fine flakes of mica; strongly acid.

The predominantly loamy horizons extend to a depth of 30 to more than 60 inches. The solum is 30 to 60 inches thick. The depth to bedrock is more than 5 feet. Reaction is strongly acid or moderately acid in the A horizon and strongly acid or very strongly acid in the B and C horizons. The content of rock fragments, which are mostly pebbles and cobbles, ranges from 0 to 35 percent, by volume, in the C horizon.

The A horizon has hue of 10YR, value of 4 or 5, and chroma of 1 to 3. The BA horizon, if it occurs, has hue of 10YR, value of 4 or 5, and chroma of 3 to 6. It is loam, sandy loam, or fine sandy loam.

The Bt horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 4 to 8. The upper 24 inches of the horizon has mottles with chroma 2 or less. The horizon is dominantly sandy clay loam or clay loam. In some pedons, however, it is clay the lower part.

The Cg horizon has hue of 10YR to 5Y, value of 5 to 7, and chroma of 1 to 8. It has mottles in shades of brown and yellow. It is sandy or loamy in the fine-earth fraction.

Ditney Series

The Ditney series consists of moderately deep, well drained soils that formed in material weathered from quartzite or phyllite. These soils are on low and intermediate mountain side slopes and ridgetops. Slopes range from 10 to 95 percent. The soils are coarse-loamy, mixed, mesic Typic Dystrochrepts.

Typical pedon of Ditney gravelly fine sandy loam, in an area of Ditney-Unicoi complex, 25 to 80 percent slopes, very stony; in a forest north of Lake James, about 1.0 mile east of Hankins on Secondary Road 1501 from its intersection with Secondary Road 1550, about 2.6 miles east on Secondary Road 1552 to Bailey Creek, about 2.7 miles north on a logging road, about

0.3 mile west on another logging road, about 200 feet north of the road:

Oi—1 inch to 0; pine and hardwood litter.
A1—0 to 2 inches; very dark grayish brown (10YR 3/2) gravelly fine sandy loam; weak fine granular structure; friable; many fine, medium, and coarse roots; about 30 percent, by volume, rock fragments; very strongly acid; clear wavy boundary.
A2—2 to 7 inches; brown (10YR 5/3) gravelly fine sandy loam; weak medium granular structure; friable; many fine, medium, and coarse roots; about 30 percent, by volume, rock fragments; very strongly acid; clear wavy boundary.
Bw—7 to 27 inches; yellowish brown (10YR 5/6) cobbly fine sandy loam; weak medium subangular blocky structure; friable; common fine and medium roots; 15 to 25 percent, by volume, rock fragments; very strongly acid; abrupt wavy boundary.
R—27 inches; hard, unweathered quartzite bedrock.

The loamy horizons are 20 to 40 inches deep over hard bedrock. The thickness of the solum and the depth to bedrock range from 20 to 40 inches. The content of rock fragments ranges from 15 to 35 percent, by volume, in the A horizon and from 10 to 35 percent in the B horizon. Reaction ranges from strongly acid to extremely acid.

The A horizon has hue of 10YR, value of 3 to 5, and chroma of 1 to 4. Where value is 3, the horizon is less than 7 inches thick.

The BA horizon, if it occurs, and the Bw horizon have hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 3 to 8. They are loam, fine sandy loam, or sandy loam in the fine-earth fraction.

The R horizon is hard, unweathered quartzite or phyllite bedrock.

Edneyville Series

The Edneyville series consists of very deep, well drained soils that formed in material weathered from gneiss or schist. These soils are on low and intermediate mountain ridgetops and side slopes. Slopes range from 10 to 80 percent. The soils are coarse-loamy, mixed, mesic Typic Dystrochrepts.

Typical pedon of Edneyville gravelly sandy loam, in an area of Edneyville-Chestnut complex, 25 to 80 percent slopes, stony; in a forest near Sunny Vale, about 5.5 miles northwest on North Carolina Highway 80 from its intersection with Secondary Road 1437, about 2 miles north on Blue Ridge Parkway, about 0.8 mile southeast on a gravel road to Goode Cemetery, about 0.5 mile northeast of the cemetery:

Oi—1 inch to 0; forest litter.
A—0 to 5 inches; very dark grayish brown (10YR 3/2) gravelly sandy loam; weak medium granular structure; very friable; many fine roots; about 20 percent, by volume, rock fragments; few fine flakes of mica; strongly acid; abrupt wavy boundary.
Bw1—5 to 10 inches; brownish yellow (10YR 6/6) sandy loam; weak fine subangular blocky structure; very friable; many fine and medium roots; common fine flakes of mica; strongly acid; clear wavy boundary.
Bw2—10 to 40 inches; yellowish brown (10YR 5/6) sandy loam; weak medium subangular blocky structure; very friable; few fine and medium roots; common fine flakes of mica; strongly acid; gradual wavy boundary.
C—40 to 60 inches; multicolored saprolite that has a texture of sandy loam; massive; very friable; common fine flakes of mica; strongly acid.

The loamy horizons extend to a depth of 40 to more than 60 inches. The solum is 20 to 55 inches thick. The depth to bedrock is more than 60 inches. The content of rock fragments ranges from 15 to 35 percent, by volume, in the A horizon, from 0 to 15 percent in the B horizon, and from 5 to 35 percent in the C horizon. Reaction is very strongly acid to moderately acid, except where the surface layer has been limed. Few or common flakes of mica are throughout the profile.

The A horizon has hue of 10YR or 7.5YR, value of 3 to 5, and chroma 2 to 4. Where value is 3, the horizon is less than 7 inches thick.

The AB horizon, if it occurs, has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 3 or 4. It is loam, fine sandy loam, or sandy loam.

The Bw horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 3 to 8. It is loam, fine sandy loam, or sandy loam.

The C horizon is saprolite that has colors similar to those of the Bw horizon or is multicolored. It has a texture of loam, fine sandy loam, or sandy loam in the fine-earth fraction.

Elsinboro Series

The Elsinboro series consists of very deep, well drained soils that formed in old stream sediments. These soils are on stream terraces. Slopes range from 1 to 4 percent. The soils are fine-loamy, mixed, mesic Typic Hapludults.

Typical pedon of Elsinboro loam, 1 to 4 percent slopes, rarely flooded; in a field near Pleasant Gardens, about 0.7 mile east on U.S. Highway 70 from its intersection with North Carolina Highway 80, about 400 feet south of the road, about 400 feet north of the Catawba River:

Ap—0 to 12 inches; dark yellowish brown (10YR 4/4) loam; weak fine granular structure; friable; common fine roots; few flakes of mica; strongly acid; abrupt smooth boundary.

BA—12 to 18 inches; yellowish brown (10YR 5/6) loam; weak fine subangular blocky structure; friable; few fine roots; few flakes of mica; strongly acid; gradual wavy boundary.

Bt—18 to 40 inches; strong brown (7.5YR 5/6) clay loam; moderate medium subangular blocky structure; friable; few flakes of mica; strongly acid; gradual wavy boundary.

BC—40 to 48 inches; yellowish brown (10YR 5/6) loam; weak fine subangular blocky structure; friable; few fine roots; few flakes of mica; strongly acid; clear wavy boundary.

C1—48 to 54 inches; yellowish brown (10YR 5/6) loam; massive; friable; few flakes of mica; strongly acid; clear wavy boundary.

C2—54 to 60 inches; yellowish brown (10YR 5/6) clay loam; massive; friable; few flakes of mica; strongly acid.

The loamy horizons extend to a depth of 40 to more than 60 inches. The solum is 28 to 50 inches thick. The depth to bedrock is more than 6 feet. The content of rock fragments ranges from 0 to 15 percent, by volume, in the A and B horizons and from 0 to 25 percent in the C horizon. Reaction is strongly acid or very strongly acid, except where the surface layer has been limed.

The A horizon has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 2 to 4. Where value is 3, the horizon is less than 6 inches thick.

The BA horizon, if it occurs, has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6. It is loam, fine sandy loam, or sandy loam.

The Bt and BC horizons have hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 5 to 8. They are loam, clay loam, or sandy clay loam.

The C or 2C horizon has colors similar to those of the Bt and BC horizons or is multicolored. It is loam, sandy loam, sandy clay loam, or clay loam in the fine-earth fraction.

Evard Series

The Evard series consists of very deep, well drained soils that formed in material weathered from gneiss or schist. These soils are on hilly uplands, low mountain ridgetops, and low mountain side slopes. Slopes range from 10 to 60 percent. The soils are fine-loamy, oxidic, mesic Typic Hapludults.

Typical pedon of Evard loam, in an area of Evard-Cowee complex, 25 to 60 percent slopes; in a forest near Dysartsville, about 1.7 miles southeast on North Carolina Highway 226 from its intersection with Secondary Road 1802, about 1.9 miles south on Secondary Road 1775, about 1,800 feet west of the road:

Oi—1 inch to 0; partially decomposed pine and hardwood litter.

A—0 to 5 inches; brown (7.5YR 4/4) loam; weak medium granular structure; very friable; few fine flakes of mica; very strongly acid; abrupt wavy boundary.

BA—5 to 8 inches; yellowish red (5YR 4/6) loam; weak medium subangular blocky structure; friable; few fine flakes of mica; very strongly acid; clear wavy boundary.

Bt—8 to 21 inches; red (2.5YR 4/8) clay loam; moderate medium subangular blocky structure; friable; common fine flakes of mica; strongly acid; clear wavy boundary.

BC—21 to 34 inches; yellowish red (5YR 4/6) loam; weak medium subangular blocky structure; friable; common fine flakes of mica; very strongly acid; gradual wavy boundary.

C—34 to 60 inches; strong brown (7.5YR 5/6) saprolite that has a texture of sandy loam; massive; friable; common fine flakes of mica; very strongly acid.

The loamy horizons extend to a depth of 60 inches or more. The solum is 20 to 40 inches thick. The depth to hard bedrock is more than 60 inches. The content of rock fragments ranges from 0 to 15 percent, by volume, in the A horizon and from 0 to 10 percent in the B and C horizons. Few or common flakes of mica are in the A and B horizons and few to many are in the C horizon. Reaction is very strongly acid to moderately acid, except where the surface layer has been limed.

The Ap or A horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 3 to 6. Where value is 3, the horizon is less than 6 inches thick.

The E horizon, if it occurs, has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. It is loam, fine sandy loam, or sandy loam.

The BA horizon, if it occurs, has hue of 5YR or 7.5YR, value of 4 to 6, and chroma of 4 to 8. It is loam, sandy loam, or sandy clay loam.

The Bt horizon has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 4 to 8. It is loam, sandy clay loam, or clay loam.

The BC horizon has hue of 2.5YR to 7.5YR, value of 4 to 6, and chroma of 6 to 8. It is loam, sandy loam, or fine sandy loam.

The C horizon is saprolite that has colors similar to those of the BC horizon. It is mottled or multicolored in some pedons. It has a texture of sandy loam, loam, or fine sandy loam.

Greenlee Series

The Greenlee series consists of very deep, well drained soils that formed in colluvium and local alluvium that moved downslope from material weathered from gneiss or schist. These soils are on benches, coves, and colluvial fans at the base of mountain slopes along the headwaters of streams. Slopes range from 6 to 25 percent. The soils are loamy-skeletal, mixed, mesic Typic Dystrochrepts.

Typical pedon of Greenlee very cobbly loam, 6 to 25 percent slopes, very bouldery; in a forested area near Old Fort, about 6 miles north on Curtis Creek Road from its intersection with U.S. Highway 70, about 1.5 miles north of a Forest Service campground, about 25 feet west of the road:

Oe—2 inches to 0; partially decomposed hardwood litter.

A—0 to 3 inches; black (10YR 2/1) very cobbly loam; weak fine granular structure; very friable; few fine flakes of mica; many fine and medium roots; about 40 percent, by volume, gravel, cobbles, stones, and boulders; extremely acid; clear wavy boundary.

BA—3 to 8 inches; dark brown (10YR 4/3) very cobbly sandy loam; weak fine subangular blocky structure; friable; few fine flakes of mica; common fine and medium roots; about 40 percent, by volume, gravel, cobbles, and stones; very strongly acid; clear smooth boundary.

Bw—8 to 26 inches; dark yellowish brown (10YR 4/6) very cobbly sandy loam; weak medium subangular blocky structure; friable; common fine flakes of mica; about 40 percent, by volume, gravel, cobbles, and stones; strongly acid; gradual wavy boundary.

BC—26 to 70 inches; yellowish brown (10YR 5/6) very cobbly loamy sand; massive; friable; common fine flakes of mica; about 45 percent, by volume, gravel, cobbles, and stones; strongly acid; gradual wavy boundary.

C—70 to 80 inches; strong brown (7.5YR 5/6) very cobbly loamy sand; few medium distinct yellowish red (5YR 4/6) mottles; massive; very friable; common fine flakes of mica; about 50 percent, by volume, gravel, cobbles, stones, and boulders; strongly acid.

The predominantly loamy horizons extend to a depth of 40 inches or more. The solum is 20 to more than 60 inches thick. The depth to bedrock is more than 5 feet. The content of rock fragments ranges from 35 to 60 percent, by volume, in the A and B horizons and from 35 to 80 percent in the C horizon. The volume and size of the rock fragments increase with depth. The content of flakes of mica ranges from none to common throughout the profile. Reaction is extremely acid to moderately acid throughout the profile, except where the surface layer has been limed.

The A horizon has hue of 7.5YR or 10YR, value of 2 to 5, and chroma of 1 to 4. Where value is 3 or less, the horizon is less than 7 inches thick.

The BA horizon, if it occurs, has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6. It is loam, fine sandy loam, or sandy loam in the fine-earth fraction.

The Bw horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8. It has the same textures as the BA horizon.

The BC horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 6. It is loam, fine sandy loam, sandy loam, loamy sand, or loamy fine sand in the fine-earth fraction.

The C horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 6. It loam, sandy loam, fine sandy loam, loamy sand, or sand in the fine-earth fraction.

Hayesville Series

The Hayesville series consists of very deep, well drained soils that formed in material weathered from gneiss or schist. These soils are on rolling to hilly uplands of foothills and low mountains. Slopes range from 6 to 25 percent. The soils are clayey, kaolinitic, mesic Typic Kanhapludults.

Typical pedon of Hayesville clay loam, 6 to 15 percent slopes, eroded; in a field near Dysartsville, about 0.3 mile southwest on Secondary Road 1802 from its intersection with North Carolina Highway 226, about 300 feet south of the road:

Ap—0 to 6 inches; reddish brown (5YR 5/4) clay loam; weak medium granular structure; friable; common fine roots; few quartz pebbles; few fine flakes of mica; moderately acid; abrupt smooth boundary.

Bt1—6 to 24 inches; red (2.5YR 4/8) clay; moderate medium subangular blocky structure; firm; few fine roots; common distinct clay films on faces of peds; few fine flakes of mica; strongly acid; clear wavy boundary.

Bt2—24 to 36 inches; red (2.5YR 4/8) clay loam; weak medium subangular blocky structure; firm; few fine roots; common distinct clay films on faces of peds; common medium distinct pockets of yellowish red (5YR 5/8) saprolite; common fine flakes of mica; strongly acid; gradual wavy boundary.

BC—36 to 48 inches; red (2.5YR 5/8) clay loam; weak medium subangular blocky structure; friable; few fine roots; many medium distinct yellowish red (5YR 5/8) and many medium prominent yellowish brown

(10YR 5/8) pockets of saprolite; common fine flakes of mica; very strongly acid; clear wavy boundary.

C—48 to 60 inches; red (2.5YR 5/6) saprolite that has a texture of loam; massive; friable; streaked with yellowish red (5YR 5/8), yellowish brown (10YR 5/8), and white (10YR 8/2) minerals; common fine flakes of mica; strongly acid.

The predominantly clayey Bt horizon ranges from 15 to 45 inches in thickness. The solum is 30 to 60 inches thick. The depth to bedrock is more than 5 feet. The content of rock fragments ranges from 0 to 15 percent, by volume, throughout the profile. Few or common flakes of mica are throughout the profile. Reaction is moderately acid to very strongly acid, except where the surface layer has been limed.

The A horizon has hue of 5YR to 10YR, value of 3 to 5, and chroma 2 to 4. Where value is 3, the horizon is less than 6 inches thick. It is loam or clay loam.

The E horizon, if it occurs, has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 8. It is loam or fine sandy loam.

The BA horizon, if it occurs, has hue of 5YR to 10YR, value 4 or 5, and chroma 4 to 8. It is sandy clay loam or loam.

The Bt horizon has hue of 10R to 5YR, value of 4 or 5, and chroma of 6 to 8. It is clay or clay loam.

The BC horizon has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 6 to 8. It is clay loam, sandy clay loam, or loam.

The C horizon is saprolite that has colors similar to those of the BC horizon or is multicolored. It has a texture of loam, sandy loam, or fine sandy loam.

Iotla Series

The Iotla series consists of very deep, somewhat poorly drained soils that formed in recent stream sediments. These soils are on flood plains. Slopes range from 0 to 2 percent. The soils are coarse-loamy, mixed, nonacid, mesic Aquic Udifluvents.

Typical pedon of Iotla sandy loam, 0 to 2 percent slopes, occasionally flooded; in a pasture about 3.9 miles northwest of Sugar Hill on Secondary Road 1135, about 0.25 mile north on Secondary Road 1242, about 300 feet west of the road, about 50 feet west of Haw Branch:

Ap—0 to 12 inches; dark yellowish brown (10YR 4/4) sandy loam; weak fine granular structure; very friable; many fine roots; common flakes of mica; slightly acid; clear smooth boundary.

C—12 to 21 inches; dark yellowish brown (10YR 4/4) loam; common medium distinct dark grayish brown (10YR 4/2) mottles; massive; very friable; common fine roots; common flakes of mica; moderately acid; clear smooth boundary.

Cg1—21 to 26 inches; dark grayish brown (10YR 4/2) fine sandy loam; common fine prominent yellowish brown (10YR 5/6) and few fine faint dark gray (10YR 4/1) mottles; massive; friable; common flakes of mica; moderately acid; abrupt smooth boundary.

Cg2—26 to 30 inches; mottled light brownish gray (10YR 6/2), dark gray (10YR 4/1), and light yellowish brown (10YR 6/4) sand; single grained; loose; common flakes of mica; moderately acid; abrupt smooth boundary.

Ab—30 to 50 inches; very dark gray (10YR 3/1) loam; massive; friable; common flakes of mica; moderately acid; abrupt smooth boundary.

Cg′—50 to 60 inches; light brownish gray (10YR 6/2) gravelly sand; single grained; loose; common flakes of mica; about 30 percent, by volume, gravel; moderately acid.

The predominantly loamy sediments extend to a depth of 40 inches or more over deposits of cobbles or gravel that are stratified with sandy or loamy materials. The content of rock fragments ranges from 0 to 10 percent, by volume, in the upper 40 inches and from 0 to 35 percent below a depth of 40 inches. Reaction ranges from strongly acid to neutral.

The A or Ap horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma 2 to 4. Where value is 3, the horizon is less than 7 inches thick.

The C horizon has hue of 7.5YR to 2.5Y, value of 3 to 6, and chroma of 2 to 6. It has mottles with chroma of 2 or less throughout. These mottles are indicative of a seasonal high water table. Below a depth of 20 inches, most pedons have a Cg horizon, which has hue of 10YR or 2.5Y, value of 3 to 7, and chroma of 1 or 2 or is neutral in hue and has value of 3 to 7. The part of the profile to a depth of 40 inches has a texture of loam, fine sandy loam, or sandy loam. In most pedons it also has thin layers of sand or loamy sand. The Cg horizon below a depth of 40 inches has hue of 7.5YR to 2.5Y, value of 3 to 7, and chroma of 1 or 2, or it is neutral in hue and has value of 3 to 7. The part of the profile below a depth of 40 inches has a loamy or sandy texture in the fine-earth fraction.

The Ab horizon has hue of 10YR, value of 3 to 5, and chroma of 1 to 4. It is loam, fine sandy loam, or sandy loam.

Junaluska Series

The Junaluska series consists of moderately deep, well drained soils that formed in material weathered from quartzite or phyllite. These soils are on low mountain ridgetops and side slopes. Slopes range from

6 to 60 percent. The soils are fine-loamy, mixed, mesic Typic Hapludults.

Typical pedon of Junaluska channery fine sandy loam, in an area of Junaluska-Brasstown complex, 6 to 25 percent slopes; in a forest about 1.0 mile south of Woodlawn on U.S. Highway 221 from its intersection with Secondary Road 1440, about 1.0 mile east on a Forest Service permanent access road, about 0.25 mile north on a logging road, about 25 feet east of the road:

Oi—1 inch to 0; forest litter.

A—0 to 4 inches; brown (10YR 4/3) channery fine sandy loam; weak fine granular structure; very friable; many fine and medium roots; about 25 percent, by volume, channers; few fine flakes of mica; strongly acid; abrupt wavy boundary.

BA—4 to 9 inches; strong brown (7.5YR 5/6) loam; weak fine subangular blocky structure; friable; many fine and medium roots; few fine flakes of mica; strongly acid; clear wavy boundary.

Bt—9 to 18 inches; strong brown (7.5YR 5/8) clay loam; weak medium subangular blocky structure; friable; few fine and medium roots; few fine flakes of mica; strongly acid; abrupt wavy boundary.

BC—18 to 28 inches; yellowish brown (10YR 5/6) fine sandy loam; common medium distinct very pale brown (10YR 7/4) mottles; weak fine subangular blocky structure; friable; few fine flakes of mica; strongly acid; abrupt wavy boundary.

Cr—28 to 60 inches; soft, weathered, interbedded quartzite and phyllite bedrock that is partly consolidated but can be dug with difficulty by hand tools.

The loamy horizons are 20 to 40 inches deep over soft, weathered bedrock. The solum is 15 to 39 inches thick. The depth to hard bedrock is more than 40 inches. The content of rock fragments ranges from 15 to 35 percent, by volume, in the A horizon and from 0 to 35 percent in the B and C horizons. Few or common flakes of mica are throughout the soils. Reaction ranges from extremely acid to moderately acid, except where the surface layer has been limed.

The A horizon has hue of 10YR to 5YR, value of 3 to 5, and chroma of 3 to 8. Where value is 3, the horizon is less than 6 inches thick.

The BA horizon has hue of 5YR or 7.5YR, value of 4 to 6, and chroma of 4 to 8. It is loam or fine sandy loam in the fine-earth fraction.

The Bt horizon has hue of 2.5YR to 7.5YR, value of 4 to 6, and chroma of 4 to 8. It is loam or clay loam in the fine-earth fraction.

The BC horizon has colors similar to those of the Bt horizon. It is loam or fine sandy loam in the fine-earth fraction.

The Cr horizon is soft, weathered phyllite or quartzite bedrock that is partly consolidated but can be dug with difficulty by hand tools.

Lonon Series

The Lonon series consists of very deep, well drained soils that formed in old colluvium derived from residual material weathered from quartzite and phyllite. These soils are on foot slopes, colluvial fans, and benches at the base of mountains. Slopes range from 6 to 15 percent. The soils are fine-loamy, mixed, mesic Typic Hapludults.

Typical pedon of Lonon fine sandy loam, in an area of Lonon-Northcove complex, 6 to 15 percent slopes; in a forest near Sevier, about 0.25 mile northeast on Secondary Road 1560 from its intersection with Secondary Road 1561, about 350 feet north of Conley Memorial Presbyterian Church, about 100 feet east of the road:

Oe—1 inch to 0; partially decomposed hardwood and pine litter.

A—0 to 3 inches; dark brown (10YR 4/3) fine sandy loam; weak medium granular structure; very friable; many fine and medium roots; about 3 percent, by volume, gravel; very strongly acid; abrupt wavy boundary.

E—3 to 8 inches; strong brown (7.5YR 5/6) fine sandy loam; weak medium granular structure; very friable; common medium and coarse roots; about 3 percent, by volume, gravel; very strongly acid; clear wavy boundary.

BE—8 to 12 inches; yellowish red (5YR 4/6) loam; weak fine subangular blocky structure; friable; few medium and coarse roots; about 3 percent, by volume, gravel; very strongly acid; clear wavy boundary.

Bt1—12 to 35 inches; yellowish red (5YR 4/6) clay loam; weak medium subangular blocky structure; friable; few coarse roots; common distinct clay films on faces of peds; about 3 percent, by volume, gravel; very strongly acid; clear irregular boundary.

Bt2—35 to 43 inches; red (2.5YR 4/6) cobbly clay loam; weak medium subangular blocky structure; friable; common distinct clay films on faces of peds and in rock impressions; about 20 percent, by volume, rounded quartzite cobbles and stones; very strongly acid; gradual wavy boundary.

Bt3—43 to 80 inches; red (2.5YR 4/6) very cobbly clay loam; weak medium subangular blocky structure; friable; common distinct clay films on faces of peds and in rock impressions; about 45 percent, by volume, rounded quartzite cobbles, stones, and boulders; very strongly acid.

The loamy horizons extend to a depth of 40 to more than 80 inches. The solum is 40 to more than 60 inches thick. The depth to bedrock is more than 80 inches. The content of rock fragments ranges from 0 to 15 percent, by volume, in the A horizon and from 0 to 35 percent below the A horizon to a depth of 40 inches. The content of rock fragments is as much as 60 percent, by volume, below a depth of 40 inches. Reaction ranges from extremely acid to moderately acid, except where the surface layer has been limed.

The A horizon has hue of 5YR to 10YR, value of 2 to 5, and chroma of 2 to 4. Where value is 3 or less, the horizon is less than 6 inches thick.

The E and BE horizons have hue of 5YR to 10YR, value of 3 to 6, and chroma of 4 to 6. They are fine sandy loam, sandy loam, or loam.

The Bt horizon has hue of 2.5YR or 5YR, value of 4 to 6, and chroma of 4 to 8. It is loam, clay loam, sandy clay, or loam in the fine-earth fraction.

The C horizon, if it occurs, varies in color. It is loamy colluvium.

Maymead Series

The Maymead series consists of very deep, well drained soils that formed in local alluvium and colluvium. These soils are in coves on benches and foot slopes. Slopes range from 10 to 25 percent. The soils are coarse-loamy, mixed, mesic Typic Dystrochrepts.

Typical pedon of Maymead fine sandy loam, in an area of Maymead-Greenlee-Potomac complex, 3 to 25 percent slopes; in a forest near Little Switzerland, about 6.4 miles south on North Carolina Highway 226A from its intersection with Secondary Road 1446, about 2.5 miles west on Secondary Road 1443, about 1.5 miles west on a Forest Service road to Armstrong Creek Fish Hatchery, about 0.5 mile west of the hatchery on the same road, about 300 feet west of the road across a footbridge near an old homesite:

A—0 to 5 inches; dark brown (10YR 3/3) fine sandy loam; weak fine granular structure; very friable; many fine and medium roots; about 5 percent, by volume, gravel; strongly acid; abrupt smooth boundary.

BA—5 to 8 inches; dark yellowish brown (10YR 4/6) fine sandy loam; weak fine granular structure; very friable; common fine and medium roots; about 10 percent, by volume, gravel; strongly acid; clear smooth boundary.

Bw1—8 to 18 inches; yellowish brown (10YR 5/6) sandy loam; weak medium subangular blocky structure; very friable; about 10 percent, by volume, gravel; strongly acid; clear wavy boundary.

Bw2—18 to 42 inches; yellowish brown (10YR 5/6) gravelly sandy loam; weak fine subangular blocky structure; very friable; about 25 percent, by volume, rock fragments; strongly acid; gradual wavy boundary.

C—42 to 60 inches; yellowish brown (10YR 5/6) cobbly sandy loam; massive; very friable; about 25 percent, by volume, rock fragments; strongly acid.

The loamy horizons extend to a depth of 40 to more than 60 inches. The solum is 40 to more than 60 inches thick. The depth to hard bedrock is more than 60 inches. The content of rock fragments ranges from 5 to 15 percent, by volume, in the A horizon and from 10 to 35 percent in the Bw horizon to a depth of 40 inches. Below a depth of 40 inches, the content of rock fragments in the Bw and C horizons ranges from 10 to 50 percent. Reaction is strongly acid or very strongly acid throughout the profile, except where the surface layer has been limed.

The A horizon has hue of 10YR, value of 3 to 5, and chroma of 2 or 3. Where value is 3, the horizon is less than 7 inches thick.

The BA or Bw horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6. It is loam or sandy loam in the fine-earth fraction.

The C horizon has colors and textures similar to those of the Bw horizon but may contain more and larger rock fragments.

Northcove Series

The Northcove series consists of very deep, well drained soils that formed in old colluvium and local alluvium derived from material weathered from phyllite or quartzite. These soils are on foot slopes, colluvial fans, and benches on low to intermediate mountains. Slopes range from 6 to 45 percent. The soils are loamy-skeletal, mixed mesic Typic Dystrochrepts.

Typical pedon of Northcove very cobbly sandy loam, in an area of Lonon-Northcove complex, 6 to 15 percent slopes; in a forest about 2.0 miles east of Woodlawn, about 1.3 miles east on a private road and a Forest Service gravel access road from the railroad crossing on Secondary Road 1560 at Sevier Station, about 75 feet east-northeast of the road:

Oi—3 to 2 inches; undecomposed hardwood and pine litter.

Oe—2 inches to 0; partially decomposed hardwood and pine litter.

A—0 to 3 inches; dark grayish brown (10YR 4/2) very cobbly sandy loam; weak fine granular structure; very friable; many fine and medium roots; about 35 percent, by volume, quartzite stones, cobbles, and gravel; extremely acid; clear wavy boundary.

BA—3 to 6 inches; yellowish brown (10YR 5/4) very cobbly sandy loam; weak medium granular structure; very friable; common fine and medium roots; about 40 percent, by volume, quartzite stones, cobbles, and gravel; very strongly acid; clear wavy boundary.

Bw1—6 to 30 inches; light yellowish brown (10YR 6/4) very cobbly sandy loam; weak medium subangular blocky structure; friable; few fine and medium roots; about 45 percent, by volume, quartzite stones, cobbles, and gravel; very strongly acid; gradual wavy boundary.

Bw2—30 to 60 inches; yellowish brown (10YR 5/6) very cobbly loam; weak medium subangular blocky structure; friable; about 50 percent, by volume, quartzite stones, cobbles, and gravel; very strongly acid; gradual wavy boundary.

C—60 to 80 inches; light yellowish brown (10YR 6/4) very cobbly sandy loam; massive; very friable; about 60 percent, by volume, quartzite stones, cobbles, and gravel; very strongly acid.

The loamy horizons extend to a depth of 40 to more than 60 inches. The solum is 35 to more than 60 inches thick. The depth to bedrock is more than 5 feet. The content of rock fragments ranges from 35 to 60 percent, by volume, in the A and B horizons and from 35 to 80 percent in the C horizon. Reaction ranges from extremely acid to moderately acid, except where the surface layer has been limed.

The A horizon has hue of 10YR or 7.5YR, value of 2 to 5, and chroma of 2 to 4. Where value is 3 or less, the horizon is less than 7 inches thick.

The BA horizon or AB horizon, if it occurs, has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6. It is sandy loam, fine sandy loam, or loam in the fine-earth fraction.

The Bw horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8. It has the same textures as the BA or AB horizon.

The C horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 6. It is fine sandy loam, sandy loam, or loamy sand in the fine-earth fraction.

Porters Series

The Porters Series consists of deep, well drained soils that formed in material weathered from gneiss or schist. These soils are on intermediate mountain ridgetops and side slopes. Slopes range from 6 to 80 percent. The soils are coarse-loamy, mixed, mesic Umbric Dystrochrepts.

Typical pedon of Porters loam, 6 to 25 percent slopes, stony; in a forested area about 0.6 mile southwest on Blue Ridge Parkway from its intersection with Curtis Creek Road at Big Laurel Gap, about 60 feet south of the road:

Oi—1 inch to 0; slightly decomposed hardwood leaves and twigs.

A—0 to 9 inches; very dark grayish brown (10YR 3/2) loam; weak medium granular structure; friable; many fine and medium roots; few fine flakes of mica; very strongly acid; clear wavy boundary.

BA—9 to 13 inches; dark yellowish brown (10YR 4/4) loam; weak fine subangular blocky structure; friable; many fine and medium roots; few fine flakes of mica; strongly acid; clear wavy boundary.

Bw—13 to 23 inches; yellowish brown (10YR 5/6) loam; weak medium subangular blocky structure; friable; common fine and medium roots; few fine flakes of mica; very strongly acid; gradual wavy boundary.

BC—23 to 26 inches; dark yellowish brown (10YR 4/4) fine sandy loam; weak medium subangular blocky structure; friable; few fine roots; few fine flakes of mica; strongly acid; gradual wavy boundary.

C1—26 to 34 inches; yellowish brown (10YR 5/6) saprolite that has a texture of fine sandy loam; massive; friable; few fine roots; common fine flakes of mica; strongly acid; gradual wavy boundary.

C2—34 to 48 inches; dark yellowish brown (10YR 4/4) saprolite that has a texture of loamy fine sand; few black (10YR 2/1) and yellowish brown (10YR 5/6) streaks; massive; friable; few fine roots; common fine flakes of mica; strongly acid; gradual wavy boundary.

Cr—48 to 59 inches; soft, weathered gneiss bedrock that is partly consolidated but can be dug with difficulty by hand tools.

R—59 inches; hard, unweathered gneiss bedrock.

The loamy horizons extend to a depth of 30 to 60 inches. The solum is 20 to 40 inches thick. The depth to hard bedrock is 40 to 60 inches. The content of rock fragments ranges from 0 to 15 percent, by volume, in the A horizon and from 5 to 35 percent in the B and C horizons. Few or common flakes of mica are throughout the soils. Reaction is very strongly acid to slightly acid throughout the soils, except where the surface layer has been limed.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 to 4. The BA horizon has hue of 10YR, value of 4 or 5, and chroma of 3 to 6. It is loam, fine sandy loam, or sandy loam.

The Bw horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 8. It is fine sandy loam, sandy loam, or loam in the fine-earth fraction.

The BC horizon has colors and textures similar to those of the Bw horizon.

The C horizon is saprolite that has colors similar to

those of the Bw horizon or is multicolored. It has a texture of fine sandy loam, sandy loam, or loamy fine sand in the fine-earth fraction.

The Cr horizon is soft, weathered bedrock that is partly consolidated but can be dug with difficulty by hand tools.

The R horizon is hard, unweathered gneiss or schist bedrock.

Potomac Series

The Potomac series consists of very deep, somewhat excessively drained soils that formed in cobbly and gravelly stream sediments. These soils are on low flood plains along the headwaters of major streams where stream velocities are high. Slopes range from 0 to 8 percent. The soils are sandy-skeletal, mixed, mesic Typic Udifluvents.

Typical pedon of Potomac cobbly loamy sand, 1 to 5 percent slopes, frequently flooded; in a forested area near Ashford, about 0.25 mile north on U.S. Highway 221 from its intersection with Secondary Road 1560, about 200 feet west of the road, about 10 feet east of the North Fork Catawba River:

Oi—½ inch to 0; slightly decomposed pine and hardwood litter.

A—0 to 3 inches; very dark grayish brown (10YR 3/2) cobbly loamy sand; weak fine granular structure; very friable; many fine and medium roots; about 20 percent, by volume, rounded cobbles and gravel; common fine flakes of mica; neutral; abrupt wavy boundary.

C1—3 to 8 inches; yellowish brown (10YR 5/4) cobbly loamy sand; weak fine granular structure; very friable; many fine and medium roots; about 20 percent, by volume, rounded cobbles and gravel; common fine flakes of mica; neutral; abrupt wavy boundary.

C2—8 to 96 inches; yellowish brown (10YR 5/4) very cobbly sand; single grained; loose; common fine roots; about 40 percent, by volume, rock fragments; common fine flakes of mica; neutral.

The sandy sediments extend to a depth of 5 feet or more. The depth to bedrock is more than 5 feet. The content of rock fragments ranges from 15 to 35 percent, by volume, in the A horizon and from 35 to 70 percent in the C horizon (fig. 9). Reaction ranges from strongly acid to mildly alkaline.

The A horizon has hue of 7.5YR or 10YR, value of 2 to 4, and chroma of 2 to 4. Where the value is 3 or less, the horizon is less than 7 inches thick.

The C horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 or 4. It is dominantly very cobbly sand or very cobbly loamy sand. In some pedons, however, it has thin subhorizons of cobbly loamy sand.

Figure 9.—Profile of a Potomac cobbly loamy sand. Rock fragments make up more than 35 percent, by volume, of the soil.

Rabun Series

The Rabun series consists of very deep, well drained soils that formed in material weathered from dolomite.

These soils are on mountain ridgetops and side slopes. Slopes range from 6 to 50 percent. The soils are clayey, kaolinitic, mesic Typic Rhodudults.

Typical pedon of Rabun loam, 6 to 25 percent slopes; in a forested area near Woodlawn, about 1.0 mile south of Woodlawn on U.S. Highway 221 from its intersection with Secondary Road 1440, about 1.3 miles southeast on a Forest Service permanent access road, about 1.0 mile north on a logging road to the top of Graveyard Mountain, in a road cut:

A—0 to 6 inches; dark reddish brown (5YR 3/2) loam; weak fine granular structure; friable; slightly acid; clear wavy boundary.

AB—6 to 9 inches; dark reddish brown (5YR 3/4) loam; weak fine granular structure; friable; slightly acid; abrupt wavy boundary.

Bt1—9 to 33 inches; dark red (2.5YR 3/6) clay loam; moderate fine and medium subangular blocky structure; friable; common faint clay films on faces of peds; slightly acid; gradual wavy boundary.

Bt2—33 to 72 inches; dark red (2.5YR 3/6) clay; moderate medium subangular blocky structure; firm; common distinct clay films on faces of peds; moderately acid.

The solum is 60 to more than 80 inches thick. The depth to soft, weathered bedrock is more than 6 feet. The depth to hard bedrock is more than 7 feet. The content of rock fragments ranges from 0 to 15 percent, by volume, throughout the profile. Reaction ranges from strongly acid to slightly acid, except where the surface layer has been limed.

The A horizon has hue of 10R to 5YR, value of 3, and chroma of 2 to 6. The AB horizon or BA horizon, if it occurs, has hue of 10R to 5YR, value of 3, and chroma of 3 to 6. It is loam or clay loam.

The Bt horizon has hue of 10R or 2.5YR, value of 3, and chroma of 3 to 6. It is clay or clay loam.

The BC horizon, if it occurs, has colors similar to those of the Bt horizon. It is loam or clay loam.

The C horizon, if it occurs, has hue of 10R or 2.5YR, value of 3 or 4, and chroma of 6 to 8. It is loam or clay loam.

The Rabun soils in McDowell County are taxadjuncts to the series because the solum is more than 60 inches thick and at a depth of about 60 inches the decrease in content of clay is less than 20 percent from the maximum. These differences, however, do not significantly affect the use and management of the soils.

Rosman Series

The Rosman series consists of very deep, well drained soils that formed in stream sediments. These soils are on flood plains along the major streams. Slopes range from 0 to 3 percent. The soils are coarse-loamy, mixed, mesic Fluventic Haplumbrepts.

Typical pedon of Rosman loam, 0 to 3 percent slopes, occasionally flooded; about 1.0 mile north of Woodlawn on U.S. Highway 221 to its intersection with North Carolina Highway 226 at Armstrong Creek, about 200 feet northwest on North Carolina Highway 226, about 300 feet west of the road, in a field:

Ap—0 to 11 inches; dark brown (10YR 3/3) loam; weak fine and medium granular structure; friable; common fine roots; common fine flakes of mica; strongly acid; abrupt smooth boundary.

Bw—11 to 40 inches; dark yellowish brown (10YR 4/4) loam; weak fine subangular blocky structure; friable; few fine roots; common fine flakes of mica; moderately acid; clear wavy boundary.

C1—40 to 60 inches; yellowish brown (10YR 5/6) fine sandy loam; massive; friable; common fine flakes of mica; slightly acid; gradual wavy boundary.

C2—60 to 70 inches; dark yellowish brown (10YR 4/4) loam; many medium distinct grayish brown (10YR 5/2) mottles; massive; friable; common fine flakes of mica; slightly acid.

The loamy sediments extend to a depth of 40 to more than 60 inches over deposits of sand and gravel. The solum is 35 to 60 inches thick. The content of rock fragments ranges from 0 to 15 percent, by volume, in the upper 40 inches of the soil. Below a depth of 40 inches, the content of rock fragments ranges from 0 to 50 percent. Few to many flakes of mica are throughout the profile. Reaction ranges from strongly acid to slightly acid, except where the surface layer has been limed.

The A horizon has hue of 7.5YR or 10YR, value of 3, and chroma of 2 or 3.

The Bw horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8. It has mottles with chroma of 2 or less below a depth of 40 inches. It is loam or fine sandy loam.

The C horizon has colors similar to those of the Bw horizon and has colors with chroma of 2 or 3. It ranges from sand to loam in the fine-earth fraction.

Soco Series

The Soco series consists of moderately deep, well drained soils that formed in material weathered from

quartzite or phyllite. These soils are on low and intermediate mountain ridgetops and side slopes. Slopes range from 6 to 80 percent. The soils are coarse-loamy, mixed, mesic Typic Dystrochrepts.

Typical pedon of Soco gravelly fine sandy loam, in an area of Soco-Ditney complex, 6 to 25 percent slopes, stony; in a forest near the community of Linville Falls, about 3.0 miles south on Kistler Memorial Highway from its intersection with North Carolina Highway 183, about 50 feet west of the road:

Oi—2 inches to 0; slightly decomposed hardwood and pine litter.

A—0 to 3 inches; very dark grayish brown (10YR 3/2) gravelly fine sandy loam; weak fine granular structure; very friable; many fine and medium roots; about 25 percent, by volume, rock fragments; few fine flakes of mica; strongly acid; clear wavy boundary.

Bw1—3 to 10 inches; yellowish brown (10YR 5/4) loam; weak fine subangular blocky structure; very friable; many fine and medium roots; few fine flakes of mica; strongly acid; clear wavy boundary.

Bw2—10 to 28 inches; yellowish brown (10YR 5/6) loam; weak medium subangular blocky structure; friable; common fine and medium roots; few fine flakes of mica; strongly acid; clear wavy boundary.

Cr—28 to 48 inches; soft, weathered quartzite and phyllite bedrock that is partly consolidated but can be dug with difficulty by hand tools.

R—48 inches; hard, unweathered quartzite bedrock interbedded with phyllite.

The loamy horizons are 20 to 40 inches deep over soft, weathered bedrock. The solum is 15 to 39 inches thick. The depth to hard bedrock is more than 40 inches. The content of rock fragments ranges from 15 to 35 percent, by volume, in the A horizon and from 0 to 35 percent in the Bw and C horizons. Few or common flakes of mica are throughout the soils. Reaction ranges from extremely acid to strongly acid, except where the surface layer has been limed.

The A horizon has hue of 10YR, value of 2 to 4, and chroma of 2 to 4. Where value is 3 or less, the horizon is less than 7 inches thick.

The Bw horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 4 to 8. It is loam, silt loam, or fine sandy loam in the fine-earth fraction.

The BC horizon, if it occurs, has colors and textures similar to those of the Bw horizon.

The C horizon, if it occurs, has colors similar to those of the Bw horizon or is multicolored. It is saprolite weathered from phyllite or thinly bedded quartzite bedrock. It has a texture of loam, silt loam, or fine sandy loam in the fine-earth fraction.

The Cr horizon is soft, weathered phyllite or quartzite bedrock that is partly consolidated but can be dug with difficulty by hand tools.

The R horizon is hard, unweathered quartzite or phyllite bedrock.

Tate Series

The Tate series consists of very deep, well drained soils that formed in colluvium derived from material weathered from gneiss or schist. These soils are on foot slopes, colluvial fans, and benches. Slopes range from 6 to 25 percent. The soils are fine-loamy, mixed, mesic Typic Hapludults.

Typical pedon of Tate loam, 15 to 25 percent slopes; in a forested area near Old Fort, about 1.9 miles northwest on Curtis Creek Road from its intersection with U.S. Highway 70, about 600 feet north of the road:

A—0 to 5 inches; very dark grayish brown (10YR 3/2) loam; weak medium granular structure; very friable; many fine and medium roots; common fine flakes of mica; strongly acid; clear smooth boundary.

Bt1—5 to 13 inches; reddish yellow (7.5YR 6/6) loam; weak medium subangular blocky structure; friable; few medium roots; common fine flakes of mica; strongly acid; gradual smooth boundary.

Bt2—13 to 44 inches; strong brown (7.5YR 5/6) clay loam; weak medium subangular blocky structure; friable; common fine flakes of mica; strongly acid; abrupt wavy boundary.

C—44 to 60 inches; yellowish brown (10YR 5/6) gravelly loam; weak fine subangular blocky structure; friable; common fine flakes of mica; about 25 percent, by volume, rock fragments; strongly acid.

The loamy horizons extend to a depth of 40 to more than 60 inches. The solum is 24 to more than 60 inches thick. The depth to bedrock is more than 5 feet. The content of rock fragments ranges from 0 to 15 percent, by volume, in the A horizon, from 0 to 25 percent in the B horizon, and from 5 to 35 percent in the C horizon. The content of flakes of mica ranges from none to common throughout the profile. Reaction ranges from very strongly acid to slightly acid in the A and B horizons, except where the surface layer has been limed, and is very strongly acid or strongly acid in the C horizon.

The A horizon has hue of 10YR, value of 3 to 6, and chroma of 2 to 4. Where value is 3, the horizon is less than 6 inches thick.

The E horizon, if it occurs, has hue of 10YR and value and chroma of 4 to 6. It is loam or fine sandy loam.

The BA horizon, if it occurs, has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6. It is loam or sandy clay loam.

The Bt horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 8. In some pedons it has mottles with chroma of 2 or less below its upper 24 inches. It is clay loam, sandy clay loam, or loam in the fine-earth fraction.

The BC horizon, if it occurs, has colors and textures similar to those of the Bt horizon.

The C horizon has colors similar to those of the Bt horizon or is multicolored. The texture in the fine-earth fraction varies, ranging from sand to loam.

Tusquitee Series

The Tusquitee series consists of very deep, well drained soils that formed in colluvium derived from material weathered from gneiss or schist. These soils are on colluvial fans, foot slopes, and benches. Slopes range from 10 to 45 percent. The soils are coarse-loamy, mixed, mesic Umbric Dystrochrepts.

Typical pedon of Tusquitee cobbly loam, in an area of Cullasaja-Tusquitee complex, 10 to 45 percent slopes; in a pasture near the community of Linville Falls, about 3.5 miles south on U.S. Highway 221 from its intersection with North Carolina Highway 183, about 1,800 feet west of the road, about 2,500 feet southwest of Linville Caverns:

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) cobbly loam; weak medium granular structure; friable; many fine roots; few fine flakes of mica; about 20 percent, by volume, stones, cobbles, and gravel; neutral; abrupt wavy boundary.

Bw1—8 to 15 inches; brown (7.5YR 4/4) loam; weak fine subangular blocky structure; friable; common fine roots; few fine flakes of mica; moderately acid; clear wavy boundary.

Bw2—15 to 31 inches; brown (7.5YR 4/4) loam; weak medium subangular blocky structure; friable; few fine roots; few fine flakes of mica; moderately acid; gradual wavy boundary.

Bw3—31 to 49 inches; strong brown (7.5YR 5/6) loam; weak medium subangular blocky structure; friable; few fine roots; few fine flakes of mica; moderately acid; gradual wavy boundary.

BC—49 to 60 inches; strong brown (7.5YR 5/6) loam; weak fine and medium subangular blocky structure; friable; few fine roots; few fine flakes of mica; moderately acid.

The loamy horizons are 40 to more than 60 inches deep. The solum is 40 to more than 60 inches thick. The depth to bedrock is more than 60 inches. The content of rock fragments ranges from 15 to 35 percent, by volume, in the A horizon and from 0 to 35 percent in the B and C horizons. Below a depth of 40 inches, the content of rock fragments ranges from 0 to 60 percent. Reaction ranges from very strongly acid to slightly acid in the surface layer, except where the surface layer has been limed, and from very strongly acid to moderately acid in the rest of the profile.

The A or Ap horizon has hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 1 to 4.

The Bw horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 8. It is fine sandy loam, sandy loam, or loam in the fine-earth fraction.

The BC horizon has colors and textures similar to those of the Bw horizon.

The C horizon, if it occurs, is colluvium that has colors similar to those of the Bw horizon. It is fine sandy loam, sandy loam, loam, loamy fine sand, or loamy sand in the fine-earth fraction.

Udifluvents

Udifluvents consist of areas where the natural soil has been altered by excavation or covered by fill material during sand and gravel mining. These soils are well drained. They are on flood plains. Soil from the excavated areas has been used in foundations for buildings and roads and for similar uses. Many of the fill or spoil areas consist of material stockpiled for future uses, such as landscaping the existing site when mining is completed. Slopes are generally less than 6 percent but are nearly vertical on some short cut slopes.

A typical pedon is not given for these soils because of their variability. The fill areas are commonly more than 20 inches deep and are as deep as 10 feet in places. The soils are stratified and vary in color and texture.

Udifluvents have hue of 7.5YR to 2.5Y, value of 3 to 7, and chroma of 3 to 8. The texture varies, ranging from sand to loamy sand in the fine-earth fraction. Thin layers of loamy material are within the upper 40 inches. Reaction ranges from extremely acid to neutral.

Udorthents

Udorthents consist of areas where natural soil has been altered by excavation or covered by earthy fill material. These areas are well drained. The excavated areas are mainly borrow areas from which soil has been removed and used in foundations for buildings and roads. In some areas the texture of the exposed substratum of the excavated soil ranges from sandy loam to clay loam. In a few places bedrock is exposed. The fill areas are sites where at least 20 inches of earthy fill material covers the natural soil or where

borrow pits, dumps, natural drainageways, or low areas have been filled. Slopes range from 0 to 50 percent.

A typical pedon is not given for these soils because of their variability. The fill areas mainly are more than 20 inches deep and are as deep as 20 to 30 feet in places. Some areas have inclusions of nonsoil material, such as concrete, wood, glass, and asphalt. The soils are stratified and vary in color and texture.

Udorthents have hue of 2.5YR to 10YR, value of 3 to 7, and chroma of 3 to 8. The texture varies, ranging from sandy loam to clay loam. Reaction ranges from extremely acid to slightly acid, except where the surface layer has been limed.

Unicoi Series

The Unicoi series consists of shallow, excessively drained soils that formed in material weathered from quartzite or phyllite. These soils are on low and intermediate mountain side slopes and ridgetops. Slopes range from 10 to 95 percent. The soils are loamy-skeletal, mixed, mesic Lithic Dystrochrepts.

Typical pedon of Unicoi gravelly fine sandy loam, in an area of Ditney-Unicoi-Rock outcrop complex, 60 to 95 percent slopes; in a forest about 9 miles south of the community of Linville Falls on the Kistler Memorial Highway from its intersection with North Carolina Highway 183, about 4.7 miles southwest on a Forest Service road to Dobson Knob, about 8,200 feet at 186 degrees south-southwest, about 1,300 feet due south of Bald Knob:

Oi—1 inch to 0; slightly decomposed pine and hardwood litter.

A1—0 to 2 inches; very dark grayish brown (10YR 3/2) gravelly fine sandy loam; weak medium granular structure; friable; many fine and medium roots; about 30 percent rock fragments; very strongly acid; clear wavy boundary.

A2—2 to 4 inches; brown (10YR 4/3) gravelly fine sandy loam; weak medium granular structure; friable; common fine and medium roots; about 30 percent rock fragments; very strongly acid: clear wavy boundary.

Bw—4 to 12 inches; brownish yellow (10YR 6/6) very cobbly fine sandy loam; weak fine subangular blocky structure; friable; about 45 percent rock fragments; very strongly acid.

R—12 inches; hard, unweathered quartzite bedrock.

The loamy horizons are 10 to 20 inches deep over hard bedrock. The solum is 10 to 20 inches thick. The content of rock fragments averages 35 to 65 percent, by volume, throughout the soils. It is as little as 15 percent in some horizons. Reaction ranges from strongly acid to extremely acid throughout the soils.

The A horizon has hue of 10YR, value of 3 to 6, and chroma of 1 to 4. Where value is 3, the horizon is less than 7 inches thick.

The Bw horizon has hue of 10YR, value of 4 to 6, and chroma of 3 to 8. It is loam, fine sandy loam, or sandy loam in the fine-earth fraction.

The R horizon is hard, unweathered quartzite bedrock.

Formation of the Soils

This section describes the factors of soil formation and relates them to the soils in the county. It also gives information about the morphology of the soils and the processes of horizon differentiation.

Factors of Soil Formation

Soils are formed through the interaction parent material, climate, plant and animal life, relief, and time *(5)*. The relative influence of each of these five major factor varies from place to place. In some places one factor dominates the formation of a soil and determines most of its properties.

Parent Material

Parent material is the material in which a soil forms. It influences the mineral and chemical composition of the soil and to a large extent determines the rate of soil formation. Residual material, alluvial sediments, and colluvium are the major types of parent material in McDowell County.

Residual material is earthy material derived from the weathering of rocks. It is commonly referred to as saprolite or residuum. In McDowell County, saprolite underlies the soils in upland positions, which account for most of the land area of the county. It ranges from a few inches to several feet in thickness. Gneiss, schist, quartzite, and phyllite are the major types of rock in the county. Soils that formed in residuum are influenced by soil creep, which is the movement of soil downslope because of gravity. Soil creep is more pronounced on the steeper slopes.

Alluvial sediments consist of material that has been eroded by water from upland soils and deposited on flood plains along streams. Recent deposits are composed of sand, silt, clay, and in places gravel and cobbles. These deposits are generally more than 5 feet thick. In places the alluvial sediments are much older and are on high stream terraces that were once flood plains.

Colluvium consists of soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the base of steep slopes. These deposits are generally more than 5 feet thick.

Climate

The generally warm, humid climate in most of McDowell County has caused strong weathering and leaching of the soils. In many places the soil materials have weathered to a considerable depth because of exposure to climatic forces over a long period. The only materials that are not deeply or strongly weathered are highly resistant to weathering or have been exposed to weathering for a short time. The material on some steep slopes is an example. The cool, humid climate in a few areas on high mountains has resulted in weakly developed soils in these areas.

Most of the bases have been leached from the soils in the county. These soils are naturally acid. Weathering and leaching have left the natural supply of plant nutrients low in most of the soils. Because of the downward movement of clay from the surface layer, the subsoil is enriched with clay in most of the soils on uplands in the low mountains and intermountain areas. The subsoil of most of the soils on intermediate to high mountains has not been in place long enough to be enriched with clay. Alternate wetting and drying and freezing and thawing are responsible for the formation of blocky structure in the clay-enriched subsoils. More detailed information concerning the climate in the county is given in the section "General Nature of the County."

Plant and Animal Life

Plants and animals influence the formation and differentiation of soil horizons. The type and number of organisms in and on the soil are determined in part by climate and in part by the nature of the soil material, relief, and the age of the soil. Bacteria, fungi, and other micro-organisms aid in the weathering of rocks and in the decomposition of organic matter. The plants and animals that live on a soil are the primary source of organic material.

Plants generally supply the majority of the organic material to a soil. This material decomposes and gives a dark color to the surface layer. The plants also supply nutrients to the surface layer.

Plants effect the base status and the leaching

process in a soil through the nutrient cycle. In areas of the native forest in McDowell County, not enough bases are brought to the surface by plants to counteract the effects of leaching.

Generally, the soils in the county formed under hardwood forest. Trees take up elements from the subsoil and add organic matter to the soil by depositing leaves, roots, twigs, and eventually branches and trunks. The material on the surface is acted upon by organisms and undergoes chemical reactions.

Organic material decomposes rapidly in the county because of the moderate temperature, the abundant moisture supply, and the character of the organic material. It decays so rapidly that little of it accumulates in the soil.

Animals convert complex compounds into simpler forms, add organic matter to the soil, and modify certain chemical and physical properties of soil. In McDowell County most of the organic material accumulates on the surface. It is acted upon by micro-organisms, fungi, earthworms, and other forms of life and by direct chemical reaction. It is mixed with the uppermost mineral part of the soil by the activities of earthworms and other small invertebrates. This mixing generally makes the soil more open and porous.

Human activities affect soil structure. In places tillage and management practices make soils more porous. In other places foot traffic, vehicular traffic, and the use of tillage equipment compact the soils. In some areas intensive use and disturbance of the soil have accelerated the loss of soil because of erosion. Commonly, the eroded material is deposited on flood plains and in depressions. In other areas management practices have slowed the rate of erosion. In many places the soil has been chemically altered by the application of limes and fertilizers, which make the soils more favorable for desirable plants.

Relief

Relief controls surface runoff and effects the percolation of water through soil. Increased surface runoff reduces the amount of water available in the soil for plant growth. Water movement through the profile is important to soil formation because it aids chemical reactions and is necessary for leaching. In McDowell County, relief is largely determined by the kind of underlying bedrock, the geology of the area, and the amount of dissection of the landscape by streams.

Slopes in the county range from 0 to 95 percent. In the uplands, soils that have a slope of less than 15 percent generally have a deeper, better defined profile than that of the steeper soils. Examples are the well developed Hayesville and Braddock soils. Relief also affects the depth of a soil. In areas where the slope is more than 25 percent, geologic erosion removes soil material almost as fast as it forms. As a result, most of the steep or very steep soils have a thinner solum than that of the less sloping soils. Examples are Ashe and Cleveland soils, which are neither so deep nor so well developed as the less sloping soils.

Relief affects drainage. Runoff from upland areas tends to accumulate in areas of the nearly level flood plains, resulting in a high water table. An example is the somewhat poorly drained Iotla soils.

Time

The length of time that parent material has been in place and exposed to the active forces of climate and plant and animal life strongly influences the properties of a soil. The length of time that a soil has been forming is reflected in the degree of profile development.

The more level soils in the uplands are old and have profile features that reflect this age. These soils have a Bt horizon, which has been enriched with clay that moved down from the surface layer. Examples are Hayesville and Braddock soils, which are classified as Ultisols. The steeper soils in the uplands are less developed. They only have the structure and color of a Bw horizon. They have little clay enrichment. Examples are Ashe and Cleveland soils, which are classified as Inceptisols.

Young soils, such as those that formed in recent stream sediments, have not been in place long enough to develop distinct horizons. The C horizon in these soils begins essentially at the surface and is subdivided only on the basis of depositional stratification. Examples are Biltmore and Potomac soils. Most of these soils are classified as Entisols.

Morphology of the Soils

The effects of soil-forming factors are evidenced by layers, or horizons, in a soil profile. The profile extends from the surface down to materials that are little altered by the soil-forming processes.

Most soils contain three major horizons. These are the A, B, and C horizons. Some soils, particularly those in forests, also have an O horizon at the surface. The O horizon consists of an accumulation of such organic material as twigs and leaves or of humified organic material that is minimally mixed with mineral material. The major horizons can be subdivided. Lowercase letters are used to indicate differences within the horizon. For example, a Bt horizon is the best developed part of a B horizon. It has an accumulation of clay from overlying horizons.

The A horizon is a mineral surface layer. It is darkened by humified organic matter. An Ap horizon is a plow layer, commonly also darkened by organic matter. The A horizon is the layer of maximum leaching, or eluviation, of clay and iron. If considerable leaching has taken place and organic matter has not darkened the material, the horizon is called an E horizon. An E horizon is normally the lightest colored horizon in a profile.

The B horizon normally underlies an A horizon and is commonly called the subsoil. It is the horizon of maximum accumulation, or illuviation, of clay, iron, aluminum, or other compounds leached from the surface layer. It commonly has blocky structure and generally is firmer and lighter in color than the A horizon. It is darker than a C horizon or an E horizon.

The C horizon is below an A or B horizon. It consists of materials that are little altered by soil forming processes, but it may be modified by weathering.

In youthful soils, such as those that formed in recent alluvium or that are in areas of fill materials, the C horizon may be near to the surface. Not all areas of the youthful soils have a B horizon.

Processes of Horizon Differentiation

Several processes are involved in the formation of soil horizons. Among these are the accumulation of organic matter, the leaching of soluble material, the chemical reduction and movement of iron, the formation of soil structure, and the formation and translocation of clay minerals. These processes commonly operate simultaneously. They have been going on for thousands of years in old soils.

The accumulation and incorporation of organic matter occur as plant residue and organic materials deposited by human activities decompose and are mixed into the soil. These additions darken the mineral soil materials and are responsible for the formation of an A horizon.

In order for a soil to develop a distinct subsoil, lime and other soluble materials must be leached out of the surface layer. This must occur before the translocation of clay minerals because it allows the clay to disperse more easily and to be moved by percolation. Clay has accumulated in the Bt horizon of those soils classified as Ultisols. The clay was leached from the overlying horizons and stopped in the B horizon as a result of flocculation and drying up of the percolating water. The more inert materials, such as silt and sand-sized particles of quartz, become concentrated in the A horizon as the more soluble materials and clay are leached out.

The undisturbed, well drained and moderately well drained soils in McDowell County generally have a yellowish brown to reddish subsoil. These colors result from finely divided iron oxide minerals coating the sand, silt, and clay particles. These iron oxides form as iron is released by the weathering of iron bearing silicate minerals. The weathering can occur in the soil or in the material that was the source of sediments in which the soil formed. In the more poorly drained soils, gray colors in the subsoil indicate the absence of free iron oxide coatings. In the gray zones the iron was chemically reduced to a more soluble form during wet conditions when oxygen was excluded from the soil. The reduced iron was then either leached from the soil or was concentrated in red or yellow mottles and concretions of iron oxide.

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Glossary

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well-aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the total cation-exchange capacity.

Bedding planes. Fine stratifications, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediments.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Cable yarding. A method of moving felled trees to a nearby central area for transport to a processing facility. Most cable yarding systems involve use of a drum, a pole, and wire cables in an arrangement similar to that of a rod and reel used for fishing. To reduce friction and soil disturbance, felled trees generally are reeled in while one end is lifted or the entire log is suspended.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Channery soil. A soil that is, by volume, more than 15 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. A single piece is called a channer.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clayey. A general textural term that includes sandy clay, silty clay, and clay. According to family level criteria in the soil taxonomic system, a specific textural name referring to fine earth (particles less than 2 millimeters in size) containing 35 percent or more clay, by weight, within the control section. The content of rock fragments is less than 35 percent, by volume.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

CMAI (cumulative mean annual increment). The age or rotation at which growing stock of a forest produces the greatest annual growth (for that time period). It is the age at which periodic annual growth and mean annual growth are equal.

Coarse fragments. If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles (flagstone) 15 to 38 centimeters (6 to 15 inches) long.

Coarse textured soil. Sand or loamy sand.

Cobblestone (or cobble). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Colluvium. Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex slope. Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils are somewhat similar in all areas.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are:

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Cove. The steep or very steep, concave colluvial areas at the head of drainageways in Piedmont and mountainous areas. These areas commonly have higher tree site indexes than surrounding slopes.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Crop residue management. Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Dbh (diameter at breast height). The diameter of a tree at 4.5 feet above the ground level on the uphill side.

Deferred grazing. Postponing grazing or resting grazingland for a prescribed period.

Delineation. The process of drawing or plotting features on a map with lines and symbols.

Depth class. Refers to the depth to a root-restricting layer. Unless otherwise stated, this layer is understood to be consolidated bedrock. The depth classes in this survey are:

Very shallow	less than 10 inches
Shallow	10 to 20 inches
Moderately deep	20 to 40 inches
Deep	40 to 60 inches
Very deep	more than 60 inches

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of

artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Engineering index test data. Laboratory test and mechanical analysis of selected soils in the county.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic)—Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated)—Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as fire, that exposes the surface.

Erosion classes. Classes based on estimates of past erosion. The classes are as follows:

Class 1.—Soils that have lost some of the original A horizon but on the average less than 25 percent of the original A horizon or of the uppermost 8 inches (if the original A horizon was less than 8 inches thick). Throughout most of the area, the thickness of the surface layer is within the normal range of variability of the uneroded soil. Class 1 erosion typically is not designated in the name of the map unit or in the map symbol.

Class 2.—Soils that have lost an average of 25 to 75 percent of the original A horizon or of the uppermost 8 inches (if the original A horizon was less than 8 inches thick). Throughout most cultivated areas of class 2 erosion, the surface layer consists of a mixture of the original A horizon and material from below. Some areas may have intricate patterns ranging from uneroded spots to spots where all of the original A horizon has been removed.

Class 3.—Soils that have lost an average of 75 percent or more of the original A horizon or of the uppermost 8 inches (if the original A horizon was less than 8 inches thick). In most cultivated areas

of class 3 erosion, material that was below the original A horizon is exposed. The plow layer consists entirely or largely of this material.

Class 4.—Soils that have lost all of the original A horizon or of the uppermost 8 inches (if the original A horizon was less than 8 inches thick) plus some or all of the deeper horizons throughout most of the area. The original soil can be identified only in spots. Some areas may be smooth, but most have an intricate pattern of gullies.

Erosion hazard. Terms describing the potential for future erosion, inherent in the soil itself, in inadequately protected areas. The following definitions are based on estimated annual soil loss in tons per acre (values determined by the Universal Soil Loss Equation assuming bare soil conditions and using rainfall and climate factors for North Carolina):

0 tons per acre	none
Less than 1 ton per acre	slight
1 to 5 tons per acre	moderate
5 to 10 tons per acre	severe
More than 10 tons per acre	very severe

Evapotranspiration. The combined loss of water from a given area through surface evaporation and through transpiration by plants during a specified period.

Excess fines (in tables). Excess silt and clay in the soil. The soil is not a source of gravel or sand for construction purposes.

Fast intake (in tables). The movement of water into the soil is rapid.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Field border. A strip of perennial vegetation (trees, shrubs, or herbaceous plants) established on the edge of a field to control erosion, provide travel lanes for farm machinery, control competition from adjacent woodland, or provide food and cover for wildlife.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fine textured soil. Sandy clay, silty clay, or clay.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist, 6 to 15 inches (15 to 37.5 centimeters) long.

Flooding. The temporary covering of the soil surface by flowing water from any source, such as overflowing streams, runoff from adjacent or surrounding slopes, and inflow from high tides. The frequency of flooding generally is expressed as none, rare, occasional, or frequent. *None* means that flooding is not probable. *Rare* means that flooding is unlikely but possible under unusual weather conditions (the chance of flooding is nearly 0 percent to 5 percent in any year). *Occasional* means that flooding occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year). *Frequent* means that flooding occurs often under normal weather conditions (the chance of flooding is more than 50 percent in any year). The duration of flooding is expressed as *very brief* (less than 2 days), *brief* (2 to 7 days), *long* (7 days to 1 month), and *very long* (more than 1 month).

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Fluvial. Of or pertaining to rivers; produced by river action, as a fluvial plain.

Foot slope. The inclined surface at the base of a hill.

Forb. Any herbaceous plant that is not a grass or a sedge.

Forest type. A classification of forest land based on the species forming the majority of live-tree stocking.

Fragile (in tables). A soil that is easily damaged by use or disturbance.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

Gneiss. A coarse grained metamorphic rock in which bands rich in granular minerals alternate with bands in which schistose minerals predominate. It is commonly formed by the metamorphism of granite.

Graded stripcropping. Growing crops in strips that grade toward a protected waterway.

Granite. A coarse grained igneous rock dominated by light colored minerals, consisting of about 50 percent orthoclase and 25 percent quartz with the

balance being plagioclase feldspars and ferromagnesian silicates. Granites and granodiorites comprise 95 percent of all intrusive rocks.

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

Green-manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water (geology). Water filling all the unblocked pores of the material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the "Soil Survey Manual." The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue at the surface of a mineral soil.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an O, A, or E horizon. The B horizon is, in part, a layer of transition from the overlying horizon to the underlying C horizon. The B horizon also has distinctive characteristics, such as accumulation of clay, sesquioxides, humus, or a combination of these; prismatic or blocky structure; redder or browner colors than those in the A horizon; or a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil does not have a B horizon, the A horizon alone is the solum.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Consolidated rock (unweathered bedrock) beneath the soil. The bedrock commonly underlies a C horizon but can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Igneous rock. Rock formed by solidification from a molten or partially molten state. Major varieties include plutonic and volcanic rock. Examples are andesite, basalt, and granite.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Infiltration. The downward entry of water into the immediate surface of soil or other material. This contrasts with percolation, which is movement of water through soil layers or material.

Intermediate rock. Igneous or metamorphic crystalline rock that is intermediate in composition between mafic and felsic rock.

Interstream divide (or interstream area). The nearly level land between drainageways in relatively

undissected parts of the Coastal Plain. It is in areas on uplands, low marine terraces, and stream terraces. Soils in these areas are generally poorly drained or very poorly drained.

Landslide. The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones (in tables). Rock fragments that are 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loamy. A general textural term that includes coarse sandy loam, sandy loam, fine sandy loam, very fine sandy loam, loam, silt loam, silt, clay loam, sandy clay loam, and silty clay loam. According to family level criteria in the soil taxonomic system, a specific textural name referring to fine earth (particles less than 2 millimeters in size) of loamy very fine sand or finer textured material that contains less than 35 percent clay, by weight, within the control section. The content of rock fragments is less than 35 percent, by volume.

Low strength. The soil is not strong enough to support loads.

Mafic rock. A dark rock composed predominantly of magnesium silicates. It contains little quartz, feldspar, or muscovite mica.

Mean annual increment. The average yearly volume of a stand of trees from the year of origin to the age under consideration.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Mica. A group of silicate minerals characterized by sheet or scale cleavage. Biotite is the ferromagnesian black mica. Muscovite is the potassic white mica.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent.* The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium,* from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse,* more than 15 millimeters (about 0.6 inch).

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Overstory. The portion of the trees in a forest stand forming the upper crown cover.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water

through the soil adversely affects the specified use.

Permeability. The quality of the soil that enables water to move through the profile. Permeability is measured as the number of inches per hour that water moves through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Subsurface tunnels or pipelike cavities formed by water moving through the soil.

Placer mining. A form of mining in which soil materials and gravel are washed for gold or other valuable minerals.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range in moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Poor filter (in tables). Because of rapid permeability, the soil may not adequately filter effluent from a waste disposal system.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of the acidity or alkalinity of a soil expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are—

Ultra acid	below 3.5
Extremely acid	3.5 to 4.4
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rill. A steep-sided channel resulting from accelerated erosion. A rill is generally a few inches deep and not wide enough to be an obstacle to farm machinery.

Road cut. A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Runoff class (surface). Refers to the rate at which water flows away from the soil over the surface without infiltrating. Six classes of rate of runoff are recognized:

Ponded.—Little of the precipitation and water that runs onto the soil escapes as runoff, and free water stands on the surface for significant periods. The amount of water that is removed from ponded areas by movement through the soil, by plants, or by evaporation is usually greater than the total rainfall. Ponding normally occurs on level and nearly level soils in depressions. The water depth may fluctuate greatly.

Very slow.—Surface water flows away slowly, and free water stands on the surface for long periods or immediately enters the soil. Most of the water passes through the soil, is used by plants, or evaporates. The soils are commonly level or nearly level or are very porous.

Slow.—Surface water flows away so slowly that free water stands on the surface for moderate

periods or enters the soil rapidly. Most of the water passes through the soil, is used by plants, or evaporates. The soils are nearly level or very gently sloping, or they are steeper but absorb precipitation very rapidly.

Medium.—Surface water flows away so rapidly that free water stands on the surface for only short periods. Part of the precipitation enters the soil and is used by plants, is lost by evaporation, or moves into underground channels. The soils are nearly level or gently sloping and absorb precipitation at a moderate rate, or they are steeper but absorb water rapidly.

Rapid.—Surface water flows away so rapidly that the period of concentration is brief and free water does not stand on the surface. Only a small part of the water enters the soil. The soils are mainly moderately steep or steep and have moderate or slow rates of absorption.

Very rapid.—Surface water flows away so rapidly that the period of concentration is very brief and free water does not stand on the surface. Only a small part of the water enters the soil. The soils are mainly steep or very steep and absorb precipitation slowly.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandy. A general textural term that includes coarse sand, sand, fine sand, very fine sand, loamy coarse sand, loamy sand, loamy fine sand, and loamy very fine sand. According to family level criteria in the soil taxonomic system, a specific textural name referring to fine earth (particles less than 2 millimeters in size) of sand or loamy sand that contains less than 50 percent very fine sand, by weight, within the control section. The content of rock fragments is less than 35 percent, by volume.

Saprolite (soil science). Unconsolidated, residual material underlying the soil and grading to hard bedrock below.

Schist. A metamorphic rock dominated by fibrous or platy minerals. It has schistose cleavage and is a product of regional metamorphism.

Seasonal high water table. The highest level of a saturated zone (the apparent or perched water table) over a continuous period of more than 2 weeks in most years, but not a permanent water table.

Seepage (in tables). The movement of water through the soil adversely affects the specified use.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Skidder trails. The paths left from skidding logs and the bulldozer or tractor used to pull them.

Skidding. A method of moving felled trees to a nearby central area for transport to a processing facility. Most systems involve pulling the trees with wire cables attached to a bulldozer or rubber-tired tractor. Generally, felled trees are skidded or pulled with one end lifted to reduce friction and soil disturbance.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey area slope classes are as follows:

Nearly level	0 to 2 percent
Gently sloping	2 to 6 percent
Strongly sloping	6 to 15 percent
Moderately steep	15 to 25 percent
Steep	25 to 45 percent
Very steep	45 to 90 percent

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3

inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil compaction. An alteration of soil structure that ultimately can affect the biological and chemical properties of the soil. Compaction decreases the extent of voids and increases bulk density.

Soil creep. The slow mass movement of soil and soil materials downslope, primarily under the influence of gravity, facilitated by water saturation and by alternating freezing and thawing.

Soil map unit. A kind of soil or miscellaneous area or a combination of two or more soils or one or more soils and one or more miscellaneous areas that can be shown at the scale of mapping for the defined purposes and objectives of the soil survey. They are generally designed to reflect significant differences in use and management.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Soil strength. Load supporting capacity of a soil at specific moisture and density conditions.

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

Stand density. The degree to which an area is covered with living trees. It is usually expressed in units of basal areas per acre, number of trees per acre, or the percentage of ground covered by the tree canopy as viewed from above.

Stone line. A concentration of coarse fragments in a soil. Generally, it is indicative of an old weathered surface. In a cross section, thickness of the line can be one fragment or more. It generally overlies material that weathered in place, and it is overlain by recent sediments of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stripcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to soil blowing and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular. Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the E horizon. Generally refers to a leached horizon lighter in color and lower in organic matter content than the overlying surface layer.

Suitability ratings. Ratings for the degree of suitability of soils for pasture, crops, woodland, and engineering uses. The ratings and the general criteria used for their selection are as follows:

Well suited.—The intended use may be initiated and maintained by using only the standard materials and methods typically required for that use. Good results can be expected.

Moderately suited.—The limitations affecting the intended use make special planning, design, or maintenance necessary.

Poorly suited.—The intended use is difficult or costly to initiate and maintain because of certain soil properties, such as steep slopes, a high hazard of erosion, a high water table, depth to bedrock, and a hazard of flooding. Major soil reclamation, special design, or intensive management practices are needed.

Unsuited.—The intended use is very difficult or costly to initiate and maintain, and thus it generally should not be undertaken.

Summer fallow. The tillage of uncropped land during the summer to control weeds and allow storage of moisture in the soil for the growth of a later crop. A practice common in semiarid regions, where annual precipitation is not enough to produce a

crop every year. Summer fallow is frequently practiced before planting winter grain.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

Terrace. An embankment, or ridge, constructed on the contour or at a slight angle to the contour across sloping soils. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine." The textural classes are defined as follows:

Sands (coarse sand, sand, fine sand, and very fine sand).—Soil material in which the content of sand is 85 percent or more and the percentage of silt plus 1½ times the percentage of clay does not exceed 15.

Loamy sands (loamy coarse sand, loamy sand, loamy fine sand, and loamy very fine sand).—Soil material in which, at the upper limit, the content of sand is 85 to 90 percent and the percentage of silt plus 1½ times the percentage of clay is not less than 15; at the lower limit, the content of sand is 70 to 85 percent and the percentage of silt plus twice the percentage of clay does not exceed 30.

Sandy loams (coarse sandy loam, sandy loam, fine sandy loam, and very fine sandy loam).—Soil material in which the content of clay is 20 percent or less, the percentage of silt plus twice the percentage of clay exceeds 30, and the content of sand is 52 percent or more or soil material in which the content of clay is less than 7 percent, the content of silt is less than 50 percent, and the content of sand is 43 to 52 percent.

Loam.—Soil material that contains 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand.

Silt loam.—Soil material that contains 50 or more percent silt and 12 to 27 percent clay or 50 to 80 percent silt and less than 12 percent clay.

Silt.—Soil material that contains 80 or more percent silt and less than 12 percent clay.

Sandy clay loam.—Soil material that contains 20 to 35 percent clay, less than 28 percent silt, and 45 or more percent sand.

Clay loam.—Soil material that contains 27 to 40 percent clay and 20 to 45 percent sand.

Silty clay loam.—Soil material that contains 27 to 40 percent clay and less than 20 percent sand.

Sandy clay.—Soil material that contains 35 or more percent clay and 45 or more percent sand.

Silty clay.—Soil material that contains 40 or more percent clay and 40 or more percent silt.

Clay.—Soil material that contains 40 or more percent clay, less than 45 percent sand, and less than 40 percent silt.

Thin layer (in tables). A layer of otherwise suitable soil material that is too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Topography. The relative positions and elevations of the natural or manmade features of an area that describe the configuration of its surface.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Underlying material. Technically the C horizon; the part of the soil below the biologically altered A and B horizons.

Understory. The trees and other woody species growing under a more or less continuous cover of branches and foliage formed collectively by the upper portions of adjacent trees and other woody growth.

Universal soil loss equation. An equation used to design water erosion control systems. The equation is A=RKLSPC wherein A is the average annual soil loss in tons per acre per year, R is the rainfall factor, K is the soil erodibility factor, L is the length of slope, S is the steepness of slope, P is the conservation practice factor, and C is the cropping and management factor.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Variegation. Refers to patterns of contrasting colors that are assumed to be inherited from the parent material rather than to be the result of poor drainage.

Water table (apparent). A thick zone of free water in the soil. The apparent water table is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil.

Water table (perched). A saturated zone of water in the soil standing above an unsaturated zone.

Water table (seasonal high). The highest level of a saturated zone in the soil (the apparent or perched water table) over a continuous period of more than 2 weeks in most years, but not a permanent water table.

Weathering. All physical and chemical changes produced by atmospheric agents in rocks or other deposits at or near the earth's surface. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wetness. A general term applied to soils that hold water at or near the surface long enough to be a common management problem.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Windthrow. The uprooting and tipping over of trees by the wind.

Yarding paths. The paths left from cable-yarded logs as they are pulled uphill or downhill to a nearby central area.

Yield (forest land). The volume of wood fiber from harvested trees taken from a certain unit of area. Yield is usually measured in board feet or cubic feet per acre.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

(Recorded in the period 1951-81 at Marion, North Carolina)

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days*	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January-----	49.8	28.1	39.0	72	4	28	4.06	2.33	5.58	7	4.8
February----	53.7	29.8	41.8	74	9	25	4.61	2.09	6.76	7	3.9
March-------	62.2	36.8	49.5	83	19	118	5.74	3.64	7.64	9	3.1
April-------	73.0	45.9	59.5	91	29	289	4.54	2.03	6.68	7	.0
May---------	79.0	53.7	66.4	91	35	508	4.63	2.34	6.61	7	.0
June--------	84.6	61.0	72.8	97	44	684	5.24	2.61	7.51	8	.0
July--------	87.3	64.8	76.1	97	54	809	4.53	2.61	6.23	9	.0
August------	86.5	64.1	75.3	96	52	784	5.29	2.48	7.70	9	.0
September---	80.6	58.4	69.5	93	42	585	4.51	1.96	6.68	6	.0
October-----	71.2	46.8	59.0	87	28	284	4.63	1.29	7.31	6	.0
November----	61.3	37.3	49.3	79	17	73	4.09	2.25	5.70	6	.2
December----	52.1	30.5	41.3	72	9	23	4.22	1.72	6.32	7	1.1
Yearly:											
Average---	70.1	46.4	58.3	---	---	---	---	---	---	---	---
Extreme---	---	---	---	98	2	---	---	---	---	---	---
Total-----	---	---	---	---	---	4,210	56.09	47.02	65.68	88	13.1

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50 degrees F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

(Recorded in the period 1951-81 at Marion, North Carolina)

Probability	Temperature 24 °F or lower	28 °F or lower	32 °F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	Mar. 30	Apr. 6	Apr. 23
2 years in 10 later than--	Mar. 23	Apr. 1	Apr. 18
5 years in 10 later than--	Mar. 9	Mar. 23	Apr. 9
First freezing temperature in fall:			
1 year in 10 earlier than--	Oct. 31	Oct. 23	Oct. 14
2 years in 10 earlier than--	Nov. 7	Oct. 28	Oct. 20
5 years in 10 earlier than--	Nov. 18	Nov. 7	Oct. 31

TABLE 3.--GROWING SEASON

(Recorded in the period 1951-81 at Marion, North Carolina)

Probability	Daily minimum temperature during growing season: Higher than 24 °F	Higher than 28 °F	Higher than 32 °F
	Days	Days	Days
9 years in 10	229	206	185
8 years in 10	237	214	192
5 years in 10	253	229	205
2 years in 10	269	243	217
1 year in 10	277	251	224

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
AcF	Ashe-Cleveland-Rock outcrop complex, 60 to 95 percent slopes	5,456	1.9
BmA	Biltmore loamy fine sand, 0 to 3 percent slopes, occasionally flooded	1,408	0.5
BrB2	Braddock clay loam, 2 to 6 percent slopes, eroded	1,836	0.6
BrC2	Braddock clay loam, 6 to 15 percent slopes, eroded	2,151	0.8
BrD2	Braddock clay loam, 15 to 25 percent slopes, eroded	182	0.1
CaD	Chestnut-Ashe complex, 10 to 25 percent slopes, stony	1,920	0.7
CaF	Chestnut-Ashe complex, 25 to 80 percent slopes, stony	44,186	15.6
CoA	Colvard loam, 0 to 2 percent slopes, occasionally flooded	1,390	0.5
CrF	Craggey-Rock outcrop complex, 40 to 90 percent slopes	256	0.1
CuE	Cullasaja-Tusquitee complex, 10 to 45 percent slopes	1,771	0.6
DdB	Dillard loam, 1 to 4 percent slopes, rarely flooded	1,452	0.5
DuD	Ditney-Unicoi complex, 10 to 25 percent slopes, very stony	400	0.1
DuF	Ditney-Unicoi complex, 25 to 80 percent slopes, very stony	3,901	1.4
DxF	Ditney-Unicoi-Rock outcrop complex, 60 to 95 percent slopes	1,375	0.5
EcD	Edneyville-Chestnut complex, 10 to 25 percent slopes, stony	1,900	0.7
EcF	Edneyville-Chestnut complex, 25 to 80 percent slopes, stony	22,593	8.0
EsB	Elsinboro loam, 1 to 4 percent slopes, rarely flooded	1,672	0.6
EvD	Evard loam, 10 to 25 percent slopes	10,557	3.7
EwE	Evard-Cowee complex, 25 to 60 percent slopes	72,149	25.4
GrD	Greenlee very cobbly loam, 6 to 25 percent slopes, very bouldery	2,885	1.0
HaC	Hayesville loam, 6 to 15 percent slopes	3,825	1.3
HcC2	Hayesville clay loam, 6 to 15 percent slopes, eroded	22,531	7.9
HeD	Hayesville-Evard complex, 15 to 25 percent slopes	29,397	10.4
HrD	Hayesville-Evard-Urban land complex, 15 to 25 percent slopes	958	0.3
HuC	Hayesville-Urban land complex, 6 to 15 percent slopes	1,876	0.7
IoA	Iotla sandy loam, 0 to 2 percent slopes, occasionally flooded	8,003	2.8
JbD	Junaluska-Brasstown complex, 6 to 25 percent slopes	1,790	0.6
JbE	Junaluska-Brasstown complex, 25 to 60 percent slopes	5,741	2.0
LnC	Lonon-Northcove complex, 6 to 15 percent slopes	2,338	0.8
MaD	Maymead fine sandy loam, 10 to 25 percent slopes, stony	373	0.1
MgD	Maymead-Greenlee-Potomac complex, 3 to 25 percent slopes	757	0.3
NoE	Northcove very cobbly sandy loam, 10 to 45 percent slopes, very stony	2,024	0.7
PoD	Porters loam, 6 to 25 percent slopes, stony	471	0.2
PoF	Porters loam, 25 to 80 percent slopes, stony	1,795	0.6
PtB	Potomac cobbly loamy sand, 1 to 5 percent slopes, frequently flooded	2,923	1.0
PxA	Potomac-Iotla complex, 0 to 3 percent slopes, mounded, frequently flooded	468	0.2
RaD	Rabun loam, 6 to 25 percent slopes	234	0.1
RaE	Rabun loam, 25 to 50 percent slopes	477	0.2
RoA	Rosman loam, 0 to 3 percent slopes, occasionally flooded	3,400	1.2
SoD	Soco-Ditney complex, 6 to 25 percent slopes, stony	756	0.3
SoF	Soco-Ditney complex, 25 to 80 percent slopes, stony	1,382	0.5
TaC	Tate loam, 6 to 15 percent slopes	2,425	0.9
TaD	Tate loam, 15 to 25 percent slopes	2,695	1.0
Uf	Udifluvents, sandy, frequently flooded	901	0.3
Uo	Udorthents, loamy	471	0.2
Ur	Urban land	586	0.2
	Water	5,413	1.9
	Total	283,450	100.0

TABLE 5.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE

(Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Soil name and map symbol	Land capability	Corn	Corn silage	Wheat	Tobacco	Tomatoes	Grass hay	Pasture
		Bu	Tons	Bu	Lbs	Tons	Tons	AUM*
AcF**:								
Ashe	VIIe	---	---	---	---	---	---	---
Cleveland	VIIe	---	---	---	---	---	---	---
Rock outcrop	VIIIs	---	---	---	---	---	---	---
BmA Biltmore	IIIs	85	18	50	2,600	22.4	3.5	5.5
BrB2 Braddock	IIIe	120	24	50	2,500	22.4	5.0	8.5
BrC2 Braddock	IVe	115	23	45	2,400	21.0	4.5	7.5
BrD2 Braddock	VIe	---	---	---	---	---	4.0	7.0
CaD:								
Chestnut	VIe	---	---	---	---	---	---	---
Ashe	VIe	---	---	---	---	---	---	---
CaF:								
Chestnut	VIIe	---	---	---	---	---	---	---
Ashe	VIIe	---	---	---	---	---	---	---
CoA Colvard	IIw	125	25	55	2,600	24.0	4.8	8.0
CrF**:								
Craggey	VIIe	---	---	---	---	---	---	---
Rock outcrop	VIIIs	---	---	---	---	---	---	---
CuE:								
Cullasaja	VIIs	---	---	---	---	---	---	7.0
Tusquitee	VIIs	---	---	---	---	---	---	7.0
DdB Dillard	IIw	125	25	55	2,500	24.0	5.7	9.5
DuD:								
Ditney	VIe	---	---	---	---	---	1.5	3.5
Unicoi	VIIs	---	---	---	---	---	1.0	3.0
DuF:								
Ditney	VIIe	---	---	---	---	---	---	---
Unicoi	VIIe	---	---	---	---	---	---	---
DxF**:								
Ditney	VIIe	---	---	---	---	---	---	---

See footnotes at end of table.

TABLE 5.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Corn silage	Wheat	Tobacco	Tomatoes	Grass hay	Pasture
		Bu	Tons	Bu	Lbs	Tons	Tons	AUM*
DxF**:								
Unicoi	VIIe	---	---	---	---	---	---	---
Rock outcrop	VIIIs	---	---	---	---	---	---	---
EcD:								
Edneyville	VIe	---	---	---	---	---	4.0	7.0
Chestnut	VIe	---	---	---	---	---	1.5	3.0
EcF:								
Edneyville	VIIe	---	---	---	---	---	---	---
Chestnut	VIIe	---	---	---	---	---	---	---
EsB Elsinboro	I	130	26	55	2,800	25.2	6.0	9.5
EvD Evard	VIe	---	---	---	---	---	4.5	7.5
EwE:								
Evard	VIIe	---	---	---	---	---	---	---
Cowee	VIIe	---	---	---	---	---	---	---
GrD Greenlee	VIIs	---	---	---	---	---	---	---
HaC Hayesville	IVe	90	18	45	2,100	16.8	3.0	5.0
HcC2 Hayesville	VIe	85	17	40	2,000	15.4	2.7	4.5
HeD:								
Hayesville	VIe	---	---	---	---	---	2.7	4.5
Evard	VIe	---	---	---	---	---	2.7	4.5
HrD**:								
Hayesville	VIe	---	---	---	---	---	---	---
Evard	VIe	---	---	---	---	---	---	---
Urban land	VIIIs	---	---	---	---	---	---	---
HuC**:								
Hayesville	IVe	80	---	45	2,100	---	---	---
Urban land	VIIIs	---	---	---	---	---	---	---
IoA*** Iotla	IIw	125	25	55	---	19.6	4.8	8.0
JbD:								
Junaluska	VIe	---	---	---	---	---	3.5	5.5
Brasstown	VIe	---	---	---	---	---	4.0	7.0

See footnotes at end of table.

TABLE 5.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Corn silage	Wheat	Tobacco	Tomatoes	Grass hay	Pasture
		Bu	Tons	Bu	Lbs	Tons	Tons	AUM*
JbE:								
Junaluska	VIIe	---	---	---	---	---	---	---
Brasstown	VIIe	---	---	---	---	---	---	---
LnC:								
Lonon	IVs	75	14	---	---	---	2.0	3.5
Northcove	VIIs	---	---	---	---	---	1.5	2.5
MaD Maymead	VIe	---	---	---	---	---	3.0	6.0
MgD:								
Maymead	VIe	---	---	---	---	---	5.0	6.0
Greenlee	VIIs	---	---	---	---	---	1.5	2.5
Potomac	Vs	---	---	---	---	---	1.0	1.5
NoE Northcove	VIIs	---	---	---	---	---	---	---
PoD Porters	VIe	---	---	---	---	---	4.5	7.5
PoF Porters	VIIe	---	---	---	---	---	---	---
PtB Potomac	Vs	---	---	---	---	---	---	---
PxA:								
Potomac	Vs	---	---	---	---	---	1.0	1.5
Iotla***	IIw	125	25	55	---	19.6	4.8	8.0
RaD Rabun	VIe	---	---	---	---	---	4.0	7.0
RaE Rabun	VIIe	---	---	---	---	---	---	---
RoA Rosman	IIw	135	26	55	2,800	26.6	5.5	9.5
SoD:								
Soco	VIe	---	---	---	---	---	---	---
Ditney	VIe	---	---	---	---	---	---	---
SoF:								
Soco	VIIe	---	---	---	---	---	---	---
Ditney	VIIe	---	---	---	---	---	---	---
TaC Tate	IVe	100	20	50	2,300	19.6	4.5	7.5
TaD Tate	VIe	---	---	---	---	---	4.0	7.0

See footnotes at end of table.

TABLE 5.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Corn silage	Wheat	Tobacco	Tomatoes	Grass hay	Pasture
		Bu	Tons	Bu	Lbs	Tons	Tons	AUM*
Uf-------------- Udifluvents	VIs	80	18	---	---	---	3.5	5.5
Uo-------------- Udorthents	VIIe	---	---	---	---	---	---	---
Ur**------------ Urban land	VIIIs	---	---	---	---	---	---	---

* Animal unit month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

** See description of the map unit for composition and behavior characteristics of the map unit.

*** Yields are based on drained soils.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY

(Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available)

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Potential productivity: Common trees	Site index	Volume*	Trees to plant
AcF**:									
Ashe-----------	3R	Severe	Severe	Moderate	Moderate	Chestnut oak--------	57	40	Eastern white pine.
						Eastern white pine--	78	139	
						Northern red oak----	---	---	
						Pitch pine----------	---	---	
						Virginia pine-------	---	---	
						Scarlet oak---------	---	---	
Cleveland------	2R	Severe	Severe	Moderate	Severe	Chestnut oak--------	45	30	Eastern white pine.
						Northern red oak----	60	43	
						Eastern white pine--	70	121	
						Hickory-------------	---	---	
						Virginia pine-------	57	84	
Rock outcrop.									
BmA------------- Biltmore	8S	Slight	Moderate	Moderate	Slight	Yellow-poplar-------	106	117	Eastern white pine, loblolly pine.
						American sycamore---	---	---	
						River birch---------	---	---	
BrB2, BrC2------ Braddock	6C	Slight	Moderate	Moderate	Slight	Yellow-poplar-------	90	90	Eastern white pine, loblolly pine.
						Northern red oak----	80	62	
						Eastern white pine--	95	176	
BrD2------------ Braddock	6R	Moderate	Moderate	Moderate	Slight	Yellow-poplar-------	90	90	Eastern white pine.
						Northern red oak----	80	62	
						Eastern white pine--	95	176	
CaD**:									
Chestnut-------	4R	Moderate	Moderate	Slight	Moderate	Chestnut oak--------	69	51	Eastern white pine.
						Northern red oak----	76	58	
						Eastern white pine--	78	139	
						Yellow-poplar-------	97	102	
						Scarlet oak---------	68	50	
						White oak-----------	70	52	
						Shortleaf pine------	---	---	
						Pitch pine----------	---	---	
Ashe-----------	3R	Moderate	Moderate	Moderate	Moderate	Chestnut oak--------	57	40	Eastern white pine.
						Eastern white pine--	78	139	
						Northern red oak----	---	---	
						Pitch pine----------	---	---	
						Virginia pine-------	---	---	
						Scarlet oak---------	---	---	
CaF**:									
Chestnut-------	4R	Severe	Severe	Slight	Moderate	Chestnut oak--------	69	51	Eastern white pine.
						Northern red oak----	76	58	
						Eastern white pine--	78	139	
						Yellow-poplar-------	97	102	
						Scarlet oak---------	68	50	
						White oak-----------	70	52	
						Pitch pine----------	---	---	

See footnotes at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume*	Trees to plant
CaF**:									
Ashe-----------	3R	Severe	Severe	Moderate	Moderate	Chestnut oak--------	57	40	Eastern white pine.
						Eastern white pine--	78	139	
						Northern red oak----	---	---	
						Pitch pine----------	---	---	
						Virginia pine-------	---	---	
						Scarlet oak---------	---	---	
CoA------------- Colvard	8A	Slight	Slight	Slight	Slight	Yellow-poplar-------	102	110	Eastern white pine, loblolly pine.
						Eastern white pine--	83	151	
						Virginia pine-------	75	115	
						White oak-----------	---	---	
						American sycamore---	---	---	
CrF**:									
Craggey---------	2R	Severe	Severe	Moderate	Severe	Northern red oak----	48	32	
						Red spruce----------	50	109	
						Fraser fir----------	---	---	
						American beech------	---	---	
						Yellow birch--------	---	---	
						American mountainash	---	---	
Rock outcrop.									
CuE**:									
Cullasaja------	8R	Moderate	Moderate	Moderate	Slight	Yellow-poplar-------	103	112	Eastern white pine.
						Northern red oak----	---	---	
						Yellow birch--------	---	---	
						Scarlet oak---------	---	---	
Tusquitee------	8R	Moderate	Moderate	Slight	Slight	Yellow-poplar-------	103	112	Eastern white pine.
						Eastern white pine--	90	166	
						Northern red oak----	---	---	
						Black locust--------	---	---	
						Eastern hemlock-----	---	---	
						White oak-----------	---	---	
						Yellow birch--------	---	---	
DdB------------- Dillard	7A	Slight	Slight	Slight	Slight	Yellow-poplar-------	95	98	Eastern white pine, loblolly pine.
						Eastern white pine--	90	166	
						Shortleaf pine------	---	---	
						Virginia pine-------	80	122	
						Loblolly pine-------	---	---	
DuD**:									
Ditney---------	2R	Slight	Moderate	Moderate	Moderate	Chestnut oak--------	50	34	Eastern white pine, Virginia pine
						Virginia pine-------	50	68	
						Pitch pine----------	---	---	
Unicoi---------	2R	Slight	Moderate	Moderate	Severe	Chestnut oak--------	50	34	Virginia pine, eastern white pine.
						Virginia pine-------	40	42	
						Pitch pine----------	---	---	
DuF**:									
Ditney---------	2R	Moderate	Severe	Severe	Moderate	Chestnut oak--------	50	34	Eastern white pine, Virginia pine.
						Virginia pine-------	50	68	
						Pitch pine----------	---	---	

See footnotes at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Potential productivity: Common trees	Site index	Volume*	Trees to plant
DuF**:									
Unicoi	2R	Moderate	Severe	Severe	Severe	Chestnut oak	50	34	Virginia pine, eastern white pine.
						Virginia pine	40	42	
						Pitch pine	---	---	
DxF**:									
Ditney	2R	Moderate	Severe	Severe	Moderate	Chestnut oak	50	34	Eastern white pine, Virginia pine.
						Virginia pine	50	68	
						Pitch pine	---	---	
Unicoi	2R	Moderate	Severe	Severe	Severe	Chestnut oak	50	34	Virginia pine, eastern white pine.
						Virginia pine	40	42	
						Pitch pine	---	---	
Rock outcrop.									
EcD**:									
Edneyville	12R	Moderate	Moderate	Slight	Slight	Eastern white pine	90	166	Eastern white pine.
						Northern red oak	75	57	
						Virginia pine	75	115	
						Yellow-poplar	98	104	
						Chestnut oak	---	---	
						Scarlet oak	---	---	
Chestnut	4R	Moderate	Moderate	Slight	Moderate	Chestnut oak	69	51	Eastern white pine.
						Northern red oak	76	58	
						Eastern white pine	78	139	
						Yellow-poplar	97	102	
						Scarlet oak	68	50	
						White oak	70	52	
						Pitch pine	---	---	
EcF**:									
Edneyville	12R	Severe	Severe	Slight	Slight	Eastern white pine	90	166	Eastern white pine.
						Northern red oak	75	57	
						Virginia pine	75	115	
						Yellow-poplar	98	104	
						Chestnut oak	---	---	
						Scarlet oak	---	---	
Chestnut	4R	Severe	Severe	Slight	Moderate	Chestnut oak	69	51	Eastern white pine.
						Northern red oak	76	58	
						Eastern white pine	78	119	
						Yellow-poplar	97	102	
						Scarlet oak	68	50	
						White oak	70	52	
						Pitch pine	---	---	
EsB Elsinboro	6A	Slight	Slight	Slight	Slight	Yellow-poplar	90	90	Eastern white pine.
						Virginia pine	80	122	
						Eastern white pine	---	---	
						Northern red oak	---	---	
						White oak	---	---	
						Red maple	---	---	
						Hickory	---	---	

See footnotes at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordi- nation symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equip- ment limita- tion	Seedling mortal- ity	Wind- throw hazard	Common trees	Site index	Volume*	
EvD------------- Evard	7R	Moderate	Moderate	Slight	Slight	Yellow-poplar-------	95	98	Eastern white pine, loblolly pine.
						Virginia pine-------	70	109	
						Eastern white pine--	93	172	
						White oak-----------	---	---	
						Pitch pine----------	---	---	
						Northern red oak----	---	---	
						Hickory-------------	---	---	
EwE**:									
Evard----------	7R	Severe	Severe	Slight	Slight	Yellow-poplar-------	95	98	Eastern white pine, loblolly pine.
						Virginia pine-------	70	109	
						Eastern white pine--	93	172	
						White oak-----------	---	---	
						Pitch pine----------	---	---	
						Northern red oak----	---	---	
						Hickory-------------	---	---	
Cowee----------	3R	Severe	Severe	Slight	Moderate	Chestnut oak--------	55	38	Eastern white pine, loblolly pine.
						Virginia pine-------	63	96	
						Scarlet oak---------	54	38	
						Eastern white pine--	78	139	
						Yellow-poplar-------	80	71	
						Pitch pine----------	---	---	
						Northern red oak----	---	---	
						White oak-----------	---	---	
						Hickory-------------	---	---	
						Red maple-----------	---	---	
						Blackgum------------	---	---	
GrD------------- Greenlee	8R	Moderate	Moderate	Moderate	Slight	Yellow-poplar-------	101	109	Eastern white pine.
						Eastern hemlock-----	---	---	
						White oak-----------	---	---	
						Northern red oak----	---	---	
						Scarlet oak---------	---	---	
						Red maple-----------	---	---	
						Eastern white pine--	---	---	
						Black locust--------	---	---	
						Virginia pine-------	---	---	
HaC------------- Hayesville	7C	Slight	Moderate	Slight	Slight	Yellow-poplar-------	93	95	Eastern white pine, loblolly pine.
						Eastern white pine--	85	155	
						Virginia pine-------	74	114	
						Pitch pine----------	---	---	
						Shortleaf pine------	---	---	
HcC2------------ Hayesville	6C	Slight	Moderate	Moderate	Slight	Yellow-poplar-------	85	81	Eastern white pine, loblolly pine.
						Eastern white pine--	77	137	
						Virginia pine-------	70	109	
						Pitch pine----------	---	---	
						Northern red oak----	---	---	
HeD**:									
Hayesville-----	7R	Moderate	Moderate	Slight	Slight	Yellow-poplar-------	93	95	Eastern white pine, loblolly pine.
						Eastern white pine--	85	155	
						Virginia pine-------	74	114	
						Pitch pine----------	---	---	

See footnotes at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordi-nation symbol	Management concerns: Erosion hazard	Management concerns: Equip-ment limita-tion	Management concerns: Seedling mortal-ity	Management concerns: Wind-throw hazard	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume*	Trees to plant
HeD**:									
Evard----------	7R	Moderate	Moderate	Slight	Slight	Yellow-poplar-------	95	98	Shortleaf pine, eastern white pine, yellow-poplar.
						Virginia pine-------	70	109	
						Eastern white pine--	93	177	
						White oak-----------	---	---	
						Pitch pine----------	---	---	
						Northern red oak----	---	---	
						Hickory-------------	---	---	
HrD**:									
Hayesville.									
Evard.									
Urban land.									
HuC**:									
Hayesville.									
Urban land.									
IoA------------- Iotla	8A	Slight	Slight	Slight	Slight	Yellow-poplar-------	100	107	Eastern white pine, loblolly pine.
						American sycamore---	---	---	
						River birch---------	---	---	
JbD**:									
Junaluska------	7R	Moderate	Moderate	Moderate	Moderate	Shortleaf pine------	68	106	Eastern white pine, loblolly pine.
						Scarlet oak---------	65	48	
						Chestnut oak--------	---	---	
						Virginia pine-------	65	100	
						Eastern white pine--	86	157	
						Pitch pine----------	---	---	
						Red maple-----------	---	---	
Brasstown------	4R	Moderate	Moderate	Slight	Slight	Scarlet oak---------	80	62	Eastern white pine.
						Eastern white pine--	91	168	
						Virginia pine-------	74	114	
						Pitch pine----------	---	---	
						Northern red oak----	---	---	
						Black oak-----------	---	---	
						Chestnut oak--------	---	---	
						Hickory-------------	---	---	
JbE**:									
Junaluska------	7R	Severe	Severe	Slight	Moderate	Shortleaf pine------	68	106	Eastern white pine.
						Scarlet oak---------	65	48	
						Virginia pine-------	65	100	
						Eastern white pine--	86	157	
						Pitch pine----------	---	---	
						Chestnut oak--------	---	---	
						Red maple-----------	---	---	

See footnotes at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume*	Trees to plant
JbE**:									
Brasstown	4R	Severe	Severe	Slight	Slight	Scarlet oak	80	62	Eastern white pine.
						Eastern white pine	91	168	
						Virginia pine	74	114	
						Pitch pine	---	---	
						Northern red oak	---	---	
						Black oak	---	---	
						Chestnut oak	---	---	
						Hickory	---	---	
LnC**:									
Lonon	4A	Slight	Slight	Slight	Slight	Northern red oak	80	62	Eastern white pine.
						Eastern white pine	86	157	
						Yellow-poplar	74	61	
						White oak	---	---	
						Scarlet oak	---	---	
						Chestnut oak	---	---	
						Pitch pine	---	---	
						Hickory	---	---	
						Virginia pine	---	---	
Northcove	5X	Slight	Moderate	Moderate	Slight	Yellow-poplar	77	66	Eastern white pine.
						Eastern white pine	80	144	
						Virginia pine	---	---	
						Chestnut oak	---	---	
						Scarlet oak	---	---	
						White oak	---	---	
						Pitch pine	---	---	
MaD Maymead	6R	Moderate	Moderate	Slight	Slight	Yellow-poplar	90	90	Eastern white pine.
						Northern red oak	75	57	
MgD**:									
Maymead	6R	Moderate	Moderate	Slight	Slight	Yellow-poplar	90	90	Eastern white pine.
						Northern red oak	75	57	
						White oak	---	---	
						Eastern white pine	---	---	
Greenlee	8R	Moderate	Moderate	Moderate	Slight	Yellow-poplar	101	109	Eastern white pine.
						Eastern hemlock	---	---	
						White oak	---	---	
						Northern red oak	---	---	
						Scarlet oak	55	38	
						Red maple	---	---	
						Eastern white pine	83	151	
						Black locust	---	---	
						Virginia pine	69	107	
Potomac	6F	Slight	Slight	Moderate	Slight	Yellow-poplar	88	86	Eastern white pine.
						Black walnut	---	---	
						American sycamore	---	---	
						Eastern redcedar	---	---	

See footnotes at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume*	Trees to plant
NoE------------- Northcove	5R	Moderate	Moderate	Moderate	Slight	Yellow-poplar-------	77	66	Eastern white pine.
						Eastern white pine--	80	144	
						Virginia pine-------	---	---	
						Chestnut oak--------	---	---	
						Scarlet oak---------	---	---	
						White oak-----------	---	---	
						Pitch pine----------	---	---	
PoD------------- Porters	7R	Moderate	Moderate	Slight	Slight	Yellow-poplar-------	96	100	Eastern white pine.
						Eastern white pine--	89	164	
						Northern red oak----	---	---	
						Hickory-------------	---	---	
						Red maple-----------	---	---	
						Black locust--------	---	---	
PoF------------- Porters	7R	Severe	Severe	Slight	Slight	Yellow-poplar-------	96	100	Eastern white pine.
						Eastern white pine--	89	164	
						Northern red oak----	---	---	
						Hickory-------------	---	---	
						Red maple-----------	---	---	
						Black locust--------	---	---	
PtB------------- Potomac	6F	Slight	Slight	Moderate	Slight	Yellow-poplar-------	88	86	Eastern white pine, loblolly pine.
						Black walnut--------	---	---	
						American sycamore---	---	---	
PxA**:									
Potomac--------	6F	Slight	Slight	Moderate	Slight	Yellow-poplar-------	88	86	Eastern white pine, loblolly pine.
						Black walnut--------	---	---	
						American sycamore---	---	---	
Iotla----------	8A	Slight	Slight	Slight	Slight	Yellow-poplar-------	100	107	Eastern white pine, loblolly pine.
						River birch---------	---	---	
RaD, RaE-------- Rabun	8R	Moderate	Moderate	Slight	Slight	Yellow-poplar-------	100	107	Eastern white pine.
						Eastern white pine--	93	172	
RoA------------- Rosman	8A	Slight	Slight	Slight	Slight	Yellow-poplar-------	105	115	Eastern white pine.
						American sycamore---	---	---	
						Black walnut--------	---	---	
						Red maple-----------	---	---	
						River birch --------	---	---	
SoD**:									
Soco-----------	4R	Moderate	Moderate	Slight	Moderate	Scarlet oak---------	76	58	Eastern white pine.
						Eastern white pine--	96	178	
						Pitch pine----------	---	---	
						Virginia pine-------	---	---	
						Chestnut oak--------	68	50	
Ditney---------	2R	Slight	Moderate	Moderate	Moderate	Chestnut oak--------	50	34	Virginia pine, eastern white pine.
						Shortleaf pine------	---	---	
						Virginia pine-------	50	68	

See footnotes at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordi-nation symbol	Management concerns: Erosion hazard	Equip-ment limita-tion	Seedling mortal-ity	Wind-throw hazard	Potential productivity: Common trees	Site index	Volume*	Trees to plant
SoF**:									
Soco-----------	4R	Severe	Severe	Slight	Moderate	Scarlet oak---------	76	58	Eastern white pine.
						Eastern white pine--	96	178	
						Virginia pine-------	---	---	
						Chestnut oak--------	68	---	
						Northern red oak----	---	---	
						Pitch pine----------	---	---	
						White oak-----------	---	---	
						Black oak-----------	---	---	
						Yellow-poplar-------	---	---	
Ditney---------	2R	Moderate	Severe	Severe	Moderate	Chestnut oak--------	50	34	Eastern white pine, Virginia pine.
						Virginia pine-------	50	68	
TaC------------- Tate	6A	Slight	Slight	Slight	Slight	Yellow-poplar-------	92	93	Eastern white pine.
						Eastern white pine--	89	164	
						Virginia pine-------	---	---	
						Northern red oak----	---	---	
TaD------------- Tate	6R	Moderate	Moderate	Slight	Slight	Yellow-poplar-------	92	93	Eastern white pine.
						Eastern white pine--	89	164	
						Virginia pine-------	---	---	
						Northern red oak----	---	---	
Uf. Udifluvents									
Uo. Udorthents									
Ur**. Urban land									

* Volume is the yield in cubic feet per acre per year calculated at the age of culmination of mean annual increment for fully stocked natural stands.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 7.--RECREATIONAL DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
AcF*:					
Ashe	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Cleveland	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope.	Severe: slope, depth to rock.
Rock outcrop.					
BmA Biltmore	Severe: flooding.	Slight	Moderate: flooding.	Slight	Moderate: droughty, flooding.
BrB2 Braddock	Slight	Slight	Moderate: slope, small stones.	Slight	Slight.
BrC2 Braddock	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
BrD2 Braddock	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
CaD*:					
Chestnut	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
Ashe	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
CaF*:					
Chestnut	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
Ashe	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
CoA Colvard	Severe: flooding.	Slight	Moderate: flooding.	Slight	Moderate: droughty, flooding.
CrF*:					
Craggey	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: large stones, depth to rock, slope.	Severe: slope, fragile.	Severe: slope, depth to rock.
Rock outcrop.					

See footnote at end of table.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
CuE*:					
Cullasaja	Severe: slope.	Severe: slope.	Severe: large stones, slope, small stones.	Severe: large stones, slope.	Severe: large stones, slope.
Tusquitee	Severe: slope.	Severe: slope.	Severe: slope, small stones, large stones.	Severe: slope.	Severe: slope.
DdB Dillard	Severe: flooding.	Slight	Moderate: slope, wetness, percs slowly.	Slight	Slight.
DuD*:					
Ditney	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
Unicoi	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones.	Moderate: slope.	Severe: depth to rock.
DuF*:					
Ditney	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
Unicoi	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones.	Severe: slope.	Severe: depth to rock.
DxF*:					
Ditney	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope..	Severe: slope.
Unicoi	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones.	Severe: slope.	Severe: depth to rock.
Rock outcrop.					
EcD*:					
Edneyville	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
Chestnut	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
EcF*:					
Edneyville	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
EcF*:					
Chestnut	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
EsB Elsinboro	Severe: flooding.	Slight	Moderate: slope, small stones.	Severe: erodes easily.	Slight.
EvD Evard	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
EwE*:					
Evard	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Cowee	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
GrD Greenlee	Severe: slope.	Severe: slope.	Severe: large stones, slope, small stones.	Severe: large stones.	Severe: large stones, droughty, slope.
HaC, HcC2 Hayesville	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
HeD*:					
Hayesville	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Evard	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
HrD*:					
Hayesville	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Evard	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Urban land.					
HuC*:					
Hayesville	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
Urban land.					
IoA Iotla	Severe: flooding.	Moderate: wetness.	Moderate: flooding, small stones.	Moderate: wetness.	Moderate: flooding, wetness.
JbD*:					
Junaluska	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
Brasstown	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.

See footnote at end of table.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
JbE*:					
Junaluska	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
Brasstown	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
LnC*:					
Lonon	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
Northcove	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: large stones, slope, small stones.	Severe: large stones.	Moderate: small stones, droughty.
MaD Maymead	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
MgD*:					
Maymead	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Greenlee	Severe: slope.	Severe: slope.	Severe: large stones, slope, small stones.	Severe: large stones.	Severe: large stones, droughty, slope.
Potomac	Severe: flooding.	Moderate: flooding, large stones, small stones.	Severe: large stones, small stones, flooding.	Moderate: large stones, too sandy, flooding.	Severe: flooding.
NoE Northcove	Severe: slope.	Severe: slope.	Severe: large stones, slope, small stones.	Severe: large stones, slope.	Severe: slope.
PoD Porters	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
PoF Porters	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
PtB Potomac	Severe: flooding.	Moderate: flooding, large stones, small stones.	Severe: large stones, small stones, flooding.	Moderate: large stones, too sandy, flooding.	Severe: flooding.
PxA*:					
Potomac	Severe: flooding.	Moderate: flooding, large stones, small stones.	Severe: large stones, small stones, flooding.	Moderate: large stones, too sandy, flooding.	Severe: flooding.
Iotla	Severe: flooding.	Moderate: wetness, flooding.	Severe: flooding.	Moderate: flooding, wetness.	Severe: flooding.

See footnote at end of table.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
RaD: Rabun	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
RaE: Rabun	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
RoA: Rosman	Severe: flooding.	Slight	Moderate: flooding.	Slight	Moderate: flooding.
SoD*:					
Soco	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
Ditney	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
SoF*:					
Soco	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
Ditney	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
TaC: Tate	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
TaD: Tate	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Uf: Udifluvents	Severe: flooding, too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: droughty, flooding, too sandy.
Uo. Udorthents					
Ur*. Urban land.					

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 8.--WILDLIFE HABITAT

(See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
AcF*:										
Ashe	Very poor.	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Cleveland	Very poor.	Very poor.	Poor	Fair	Fair	Very poor.	Very poor.	Very poor.	Poor	Very poor.
Rock outcrop.										
BmA Biltmore	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
BrB2 Braddock	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
BrC2 Braddock	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
BrD2 Braddock	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
CaD*:										
Chestnut	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Ashe	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
CaF*:										
Chestnut	Very poor.	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Ashe	Very poor.	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
CoA Colvard	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Poor.
CrF*:										
Craggey	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Fair	Very poor.
Rock outcrop.										
CuE*:										
Cullasaja	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
Tusquitee	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
DdB Dillard	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.

See footnote at end of table.

TABLE 8.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
DuD*:										
Ditney	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Unicoi	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
DuF*:										
Ditney	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Unicoi	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
DxF*:										
Ditney	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Unicoi	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
Rock outcrop.										
EcD*:										
Edneyville	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Chestnut	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
EcF*:										
Edneyville	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Chestnut	Very poor.	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
EsB Elsinboro	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
EvD Evard	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
EwE*:										
Evard	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Cowee	Very poor.	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
GrD Greenlee	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
HaC, HcC2 Hayesville	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
HeD*:										
Hayesville	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.

See footnote at end of table.

TABLE 8.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
HeD*:										
Evard	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
HrD*:										
Hayesville	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Evard	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Urban land.										
HuC*:										
Hayesville	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Urban land.										
IoA Iotla	Fair	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
JbD*:										
Junaluska	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Brasstown	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
JbE*:										
Junaluska	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Brasstown	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
LnC*:										
Lonon	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Northcove	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
MaD Maymead	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
MgD*:										
Maymead	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Greenlee	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Potomac	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
NoE Northcove	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.

See footnote at end of table.

TABLE 8.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
PoD: Porters	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
PoF: Porters	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
PtB: Potomac	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
PxA*:										
Potomac	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Iotla	Fair	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
RaD: Rabun	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
RaE: Rabun	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
RoA: Rosman	Good	Good	Good	Good	Good	Fair	Very poor.	Good	Good	Very poor.
SoD*:										
Soco	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Ditney	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
SoF*:										
Soco	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Ditney	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
TaC: Tate	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
TaD: Tate	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Uf: Udifluvents	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Uo. Udorthents										
Ur*. Urban land										

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--BUILDING SITE DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
AcF*:						
Ashe	Severe: depth to rock, slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope.
Cleveland	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.
Rock outcrop.						
BmA Biltmore	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: droughty, flooding.
BrB2 Braddock	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
BrC2 Braddock	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, slope.	Severe: slope.	Severe: low strength.	Moderate: slope.
BrD2 Braddock	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
CaD*, CaF*:						
Chestnut	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Ashe	Severe: depth to rock, slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope.
CoA Colvard	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: droughty, flooding.
CrF*:						
Craggey	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope, depth to rock.
Rock outcrop.						
CuE*:						
Cullasaja	Severe: cutbanks cave, large stones, slope.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope.
Tusquitee	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
DdB--------------- Dillard	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Moderate: low strength, wetness.	Slight.
DuD*, DuF*:						
Ditney-----------	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
Unicoi-----------	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.
DxF*:						
Ditney-----------	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
Unicoi-----------	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.
Rock outcrop.						
EcD*, EcF*:						
Edneyville-------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Chestnut---------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
EsB--------------- Elsinboro	Moderate: wetness.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength.	Slight.
EvD--------------- Evard	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
EwE*:						
Evard------------	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Cowee------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
GrD--------------- Greenlee	Severe: cutbanks cave, large stones, slope.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, droughty, slope.
HaC, HcC2--------- Hayesville	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope, frost action.	Moderate: slope.
HeD*:						
Hayesville-------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
HeD*:						
Evard	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
HrD*:						
Hayesville	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Evard	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Urban land.						
HuC*:						
Hayesville	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope, frost action.	Moderate: slope.
Urban land.						
IoA: Iotla	Severe: cutbanks cave, wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.	Moderate: flooding, wetness.
JbD*, JbE*:						
Junaluska	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Brasstown	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
LnC*:						
Lonon	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
Northcove	Severe: large stones.	Severe: large stones.	Severe: large stones.	Severe: slope, large stones.	Severe: large stones.	Moderate: small stones, droughty.
MaD: Maymead	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
MgD*:						
Maymead	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Greenlee	Severe: cutbanks cave, large stones, slope.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, droughty, slope.
Potomac	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.
NoE: Northcove	Severe: large stones, slope.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope.

See footnote at end of table.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
PoD, PoF: Porters	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
PtB: Potomac	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.
PxA*:						
Potomac	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.
Iotla	Severe: cutbanks cave, wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.	Severe: flooding.
RaD, RaE: Rabun	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
RoA: Rosman	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
SoD*, SoF*:						
Soco	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Ditney	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
TaC: Tate	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
TaD: Tate	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Uf: Udifluvents	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: droughty, flooding, too sandy.
Uo. Udorthents						
Ur*. Urban land						

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--SANITARY FACILITIES

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "good," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
AcF*:					
Ashe	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, slope.
Cleveland	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, slope.	Poor: depth to rock, slope.
Rock outcrop.					
BmA: Biltmore	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage.	Poor: seepage, too sandy.
BrB2: Braddock	Moderate: percs slowly.	Severe: seepage.	Severe: seepage, too clayey.	Slight	Poor: too clayey, hard to pack.
BrC2: Braddock	Moderate: percs slowly, slope.	Severe: seepage, slope.	Severe: seepage, too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
BrD2: Braddock	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
CaD*, CaF*:					
Chestnut	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, slope.
Ashe	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, slope.
CoA: Colvard	Severe: flooding.	Severe: seepage, flooding.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage.	Good.
CrF*:					
Craggey	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, slope.	Poor: depth to rock, small stones, slope.
Rock outcrop.					

See footnote at end of table.

TABLE 10.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
CuE*:					
Cullasaja	Severe: slope, large stones.	Severe: seepage, slope, large stones.	Severe: seepage, slope, large stones.	Severe: seepage, slope.	Poor: seepage, large stones, slope.
Tusquitee	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: small stones, slope.
DdB Dillard	Severe: wetness, percs slowly.	Severe: flooding, wetness.	Severe: wetness, too clayey.	Severe: wetness.	Fair: too clayey.
DuD*, DuF*:					
Ditney	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, slope.
Unicoi	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, slope.	Poor: depth to rock, small stones, slope.
DxF*:					
Ditney	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, slope.
Unicoi	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, slope.	Poor: depth to rock, small stones, slope.
Rock outcrop.					
EcD*, EcF*:					
Edneyville	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: slope.
Chestnut	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, small stones, slope.
EsB Elsinboro	Moderate: flooding, wetness, percs slowly.	Severe: seepage.	Severe: seepage, wetness.	Severe: seepage.	Good.
EvD Evard	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
EwE*:					
Evard	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.

See footnote at end of table.

TABLE 10.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
EwE*:					
Cowee	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, slope.
GrD Greenlee	Severe: slope, large stones.	Severe: seepage, slope, large stones.	Severe: seepage, slope, large stones.	Severe: seepage, slope.	Poor: large stones, slope.
HaC, HcC2 Hayesville	Moderate: percs slowly, slope.	Severe: seepage, slope.	Severe: seepage.	Moderate: slope.	Fair: too clayey, hard to pack, slope.
HeD*:					
Hayesville	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: slope.	Poor: slope.
Evard	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
HrD*:					
Hayesville	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: slope.	Poor: slope.
Evard	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Urban land.					
HuC*:					
Hayesville	Moderate: percs slowly, slope.	Severe: seepage, slope.	Severe: seepage.	Moderate: slope.	Fair: too clayey, hard to pack, slope.
Urban land.					
IoA Iotla	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Fair: wetness.
JbD*, JbE*:					
Junaluska	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, slope.
Brasstown	Severe: slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: slope.
LnC*:					
Lonon	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, slope.

See footnote at end of table.

TABLE 10.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
LnC*:					
Northcove	Severe: large stones.	Severe: seepage, slope, large stones.	Severe: seepage, large stones.	Severe: seepage.	Poor: large stones.
MaD Maymead	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: small stones, slope.
MgD*:					
Maymead	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: small stones, slope.
Greenlee	Severe: slope, large stones.	Severe: seepage, slope, large stones.	Severe: seepage, slope, large stones.	Severe: seepage, slope.	Poor: large stones, slope.
Potomac	Severe: flooding, poor filter.	Severe: seepage, flooding.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage.	Poor: seepage, small stones.
NoE Northcove	Severe: slope, large stones.	Severe: seepage, slope, large stones.	Severe: seepage, slope, large stones.	Severe: seepage, slope.	Poor: large stones, slope.
PoD, PoF Porters	Severe: slope.	Severe: seepage, slope.	Severe: depth to rock, seepage, slope.	Severe: seepage, slope.	Poor: slope.
PtB Potomac	Severe: flooding, poor filter.	Severe: seepage, flooding.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage.	Poor: seepage, small stones.
PxA*:					
Potomac	Severe: flooding, poor filter.	Severe: seepage, flooding.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage.	Poor: seepage, small stones.
Iotla	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Fair: wetness.
RaD, RaE Rabun	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
RoA Rosman	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Fair: wetness.

See footnote at end of table.

TABLE 10.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
SoD*, SoF*:					
Soco----------------	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, slope, seepage.	Severe: depth to rock, slope, seepage.	Good.
Ditney--------------	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, slope.
TaC------------------ Tate	Moderate: percs slowly, slope.	Severe: seepage, slope.	Severe: seepage.	Moderate: slope.	Fair: too clayey, large stones, slope.
TaD------------------ Tate	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: slope.	Poor: slope.
Uf------------------- Udifluvents	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage.	Poor: seepage, too sandy.
Uo. Udorthents					
Ur*. Urban land					

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--CONSTRUCTION MATERIALS

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
AcF*:				
Ashe	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, slope.
Cleveland	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
Rock outcrop.				
BmA Biltmore	Good	Probable	Improbable: too sandy.	Poor: too sandy.
BrB2, BrC2 Braddock	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, area reclaim, small stones.
BrD2 Braddock	Fair: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, area reclaim, small stones.
CaD*:				
Chestnut	Poor: depth to rock.	Improbable: excess fines, thin layer.	Improbable: excess fines, thin layer.	Poor: small stones, slope.
Ashe	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, slope.
CaF*:				
Chestnut	Poor: depth to rock, slope.	Improbable: excess fines, thin layer.	Improbable: excess fines, thin layer.	Poor: small stones, slope.
Ashe	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, slope.
CoA Colvard	Good	Probable	Probable	Poor: area reclaim.
CrF*:				
Craggey	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, large stones, slope.
Rock outcrop.				

See footnote at end of table.

TABLE 11.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
CuE*:				
Cullasaja	Poor: large stones, slope.	Improbable: large stones.	Improbable: large stones.	Poor: large stones, area reclaim, slope.
Tusquitee	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
DdB Dillard	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
DuD*:				
Ditney	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Unicoi	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
DuF*:				
Ditney	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Unicoi	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
DxF*:				
Ditney	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Unicoi	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
Rock outcrop.				
EcD*:				
Edneyville	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Chestnut	Poor: depth to rock.	Improbable: excess fines, thin layer.	Improbable: excess fines, thin layer.	Poor: small stones, slope.
EcF*:				
Edneyville	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.

See footnote at end of table.

TABLE 11.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
EcF*:				
Chestnut	Poor: depth to rock, slope.	Improbable: excess fines, thin layer.	Improbable: excess fines, thin layer.	Poor: small stones, slope.
EsB Elsinboro	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
EvD Evard	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
EwE*:				
Evard	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Cowee	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
GrD Greenlee	Poor: large stones.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: large stones, area reclaim, slope.
HaC, HcC2 Hayesville	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
HeD*:				
Hayesville	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
Evard	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
HrD*:				
Hayesville	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
Evard	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Urban land.				
HuC*:				
Hayesville	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Urban land.				
IoA Iotla	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
JbD*:				
Junaluska	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.

See footnote at end of table.

TABLE 11.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
JbD*:				
Brasstown	Fair: depth to rock, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
JbE*:				
Junaluska	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Brasstown	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
LnC*:				
Lonon	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
Northcove	Poor: large stones.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: large stones, area reclaim.
MaD Maymead	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
MgD*:				
Maymead	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Greenlee	Poor: large stones.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: large stones, area reclaim, slope.
Potomac	Fair: large stones.	Improbable: small stones.	Probable	Poor: large stones, area reclaim, small stones.
NoE Northcove	Poor: large stones, slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: large stones, area reclaim, slope.
PoD Porters	Fair: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
PoF Porters	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.

See footnote at end of table.

TABLE 11.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
PtB------------------- Potomac	Fair: large stones.	Improbable: small stones.	Probable-------------	Poor: large stones, area reclaim, small stones.
PxA*:				
Potomac--------------	Fair: large stones.	Improbable: small stones.	Probable-------------	Poor: large stones, area reclaim, small stones.
Iotla----------------	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
RaD------------------- Rabun	Fair: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
RaE------------------- Rabun	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
RoA------------------- Rosman	Fair: wetness.	Probable-------------	Probable-------------	Fair: small stones, area reclaim.
SoD*:				
Soco-----------------	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Ditney---------------	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
SoF*:				
Soco-----------------	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Ditney---------------	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
TaC------------------- Tate	Good-----------------	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, area reclaim.
TaD------------------- Tate	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, area reclaim, slope.
Uf-------------------- Udifluvents	Good-----------------	Probable-------------	Improbable: too sandy.	Poor: too sandy.
Uo. Udorthents				
Ur*. Urban land				

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--WATER MANAGEMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Limitations for--: Pond reservoir areas	Limitations for--: Embankments, dikes, and levees	Limitations for--: Aquifer-fed excavated ponds	Features affecting--: Drainage	Features affecting--: Irrigation	Features affecting--: Terraces and diversions	Features affecting--: Grassed waterways
AcF*:							
Ashe	Severe: seepage, slope.	Severe: piping, thin layer.	Severe: no water.	Deep to water	Slope, droughty, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
Cleveland	Severe: depth to rock, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, droughty.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
Rock outcrop.							
BmA: Biltmore	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.
BrB2: Braddock	Severe: seepage.	Moderate: hard to pack.	Severe: no water.	Deep to water	Slope	Favorable	Favorable.
BrC2, BrD2: Braddock	Severe: seepage, slope.	Moderate: hard to pack.	Severe: no water.	Deep to water	Slope	Slope	Slope.
CaD*, CaF*:							
Chestnut	Severe: seepage, slope.	Severe: piping, thin layer.	Severe: no water.	Deep to water	Slope, droughty, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
Ashe	Severe: seepage, slope.	Severe: piping, thin layer.	Severe: no water.	Deep to water	Slope, droughty, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
CoA: Colvard	Severe: seepage.	Severe: piping.	Severe: cutbanks cave.	Deep to water	Droughty, flooding, soil blowing.	Soil blowing	Droughty.

See footnote at end of table.

TABLE 12.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
CrF*:							
Craggey	Severe: depth to rock, slope.	Severe: seepage, thin layer.	Severe: no water.	Deep to water	Slope, large stones, depth to rock.	Large stones, depth to rock, slope.	Large stones, depth to rock, slope.
Rock outcrop.							
CuE*:							
Cullasaja	Severe: seepage, slope.	Severe: seepage, large stones.	Severe: no water.	Deep to water	Slope, large stones, droughty.	Slope, large stones, too sandy.	Large stones, slope, droughty.
Tusquitee	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope	Slope, large stones.	Large stones, slope.
DdB: Dillard	Slight	Moderate: thin layer, wetness.	Severe: slow refill.	Favorable	Wetness, soil blowing.	Wetness, soil blowing.	Favorable.
DuD*, DuF*:							
Ditney	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, droughty, depth to rock.	Slope, depth to rock.	Slope, droughty, depth to rock.
Unicoi	Severe: depth to rock, slope.	Severe: large stones.	Severe: no water.	Deep to water	Slope, large stones, droughty.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
DxF*:							
Ditney	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, droughty, depth to rock.	Slope, depth to rock.	Slope, droughty, depth to rock.
Unicoi	Severe: depth to rock, slope.	Severe: large stones.	Severe: no water.	Deep to water	Slope, large stones, droughty.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
Rock outcrop.							

See footnote at end of table.

TABLE 12.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
EcD*, EcF*:							
Edneyville	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, droughty.	Slope	Slope, droughty.
Chestnut	Severe: seepage, slope.	Severe: piping, thin layer.	Severe: no water.	Deep to water	Slope, droughty, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
EsB Elsinboro	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Erodes easily	Erodes easily	Erodes easily.
EvD Evard	Severe: slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope	Slope.
EwE*:							
Evard	Severe: slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope	Slope.
Cowee	Severe: slope.	Severe: thin layer, piping.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
GrD Greenlee	Severe: seepage, slope.	Severe: seepage, large stones.	Severe: no water.	Deep to water	Slope, large stones, droughty.	Slope, large stones, too sandy.	Large stones, slope, droughty.
HaC, HcC2 Hayesville	Severe: seepage, slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope	Slope	Slope.
HeD*:							
Hayesville	Severe: seepage, slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope	Slope	Slope.

See footnote at end of table.

TABLE 12.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
HeD*:							
Evard	Severe: slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope	Slope.
HrD*:							
Hayesville	Severe: seepage, slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope	Slope	Slope.
Evard	Severe: slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope	Slope.
Urban land.							
HuC*:							
Hayesville	Severe: seepage, slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope	Slope	Slope.
Urban land.							
IoA Iotla	Severe: seepage.	Severe: piping, wetness.	Severe: cutbanks cave.	Flooding	Flooding, wetness.	Wetness	Favorable.
JbD*, JbE*:							
Junaluska	Severe: seepage, slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
Brasstown	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope	Slope	Slope.
LnC*:							
Lonon	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope	Slope	Slope.

See footnote at end of table.

TABLE 12.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
LnC*:							
Northcove	Severe: seepage, slope.	Severe: large stones.	Severe: no water.	Deep to water	Slope, large stones, droughty.	Slope, large stones.	Large stones, slope, droughty.
MaD Maymead	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope	Slope, large stones.	Large stones, slope.
MgD*:							
Maymead	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope	Slope, large stones.	Large stones, slope.
Greenlee	Severe: seepage, slope.	Severe: seepage, large stones.	Severe: no water.	Deep to water	Slope, large stones, droughty.	Slope, large stones, too sandy.	Large stones, slope, droughty.
Potomac	Severe: seepage.	Severe: seepage.	Severe: cutbanks cave.	Deep to water	Large stones, droughty, flooding.	Large stones, too sandy.	Large stones, droughty.
NoE Northcove	Severe: seepage, slope.	Severe: large stones.	Severe: no water.	Deep to water	Slope, large stones, droughty.	Slope, large stones.	Large stones, slope, droughty.
PoD, PoF Porters	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope	Slope	Slope.
PtB Potomac	Severe: seepage.	Severe: seepage.	Severe: cutbanks cave.	Deep to water	Large stones, droughty, flooding.	Large stones, too sandy.	Large stones, droughty.
PxA*:							
Potomac	Severe: seepage.	Severe: seepage.	Severe: cutbanks cave.	Deep to water	Large stones, droughty, flooding.	Large stones, too sandy.	Large stones, droughty.

See footnote at end of table.

TABLE 12.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
PxA*:							
Iotla	Severe: seepage.	Severe: piping, wetness.	Severe: cutbanks cave.	Flooding	Flooding, wetness.	Wetness	Favorable.
RaD, RaE: Rabun	Severe: slope.	Moderate: hard to pack.	Severe: no water.	Deep to water	Slope	Slope	Slope.
RoA: Rosman	Severe: seepage.	Severe: piping.	Severe: cutbanks cave.	Deep to water	Deep to water	Wetness	Favorable.
SoD*, SoF*:							
Soco	Severe: seepage, slope.	Severe: piping, thin layer.	Severe: no water.	Deep to water	Depth to rock, slope.	Slope, depth to rock.	Slope, depth to rock.
Ditney	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, droughty, depth to rock.	Slope, depth to rock.	Slope, droughty, depth to rock.
TaC, TaD: Tate	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope	Slope	Slope.
Uf: Udifluvents	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.
Uo. Udorthents							
Ur*. Urban land							

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--ENGINEERING INDEX PROPERTIES

(The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated)

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
AcF*:											
Ashe------------	0-7	Gravelly sandy loam.	SM, SC-SM	A-2, A-4	5-15	80-90	75-90	60-90	30-49	25-35	NP-7
	7-24	Loam, sandy loam, fine sandy loam.	SM, SC-SM	A-4	5-30	85-100	80-95	60-95	35-49	25-35	NP-7
	24-30	Gravelly sandy loam, cobbly sandy loam, sandy loam.	SM	A-2, A-4	5-30	75-95	65-95	55-95	30-49	---	NP
	30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Cleveland-------	0-17	Gravelly sandy loam.	SM, GM	A-2, A-4, A-1	2-10	65-90	50-80	45-75	20-40	<25	NP-3
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
BmA-------------- Biltmore	0-10	Loamy fine sand	SM, SP-SM	A-2-4	0-5	95-100	90-100	55-88	10-35	---	NP
	10-44	Loamy sand, loamy fine sand, sand.	SM, SP-SM	A-2-4	0-8	95-100	85-100	55-96	10-35	---	NP
	44-60	Variable---------	---	---	---	---	---	---	---	---	---
BrB2, BrC2, BrD2- Braddock	0-7	Clay loam--------	CL	A-6, A-7	0-5	80-100	75-100	65-95	50-85	35-50	15-26
	7-60	Clay loam, gravelly clay, clay.	CH, CL, SC, GC	A-7, A-2	0-15	80-100	65-100	40-95	35-90	42-66	15-35
CaD*, CaF*:											
Chestnut--------	0-5	Gravelly sandy loam.	SM, SC-SM	A-4, A-2, A-5	5-15	75-95	65-90	60-85	30-49	<50	NP-7
	5-35	Gravelly loam, gravelly fine sandy loam, sandy loam.	SM, SC-SM	A-4, A-2, A-5	0-25	75-98	65-97	60-85	34-49	<45	NP-10
	35-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
Ashe------------	0-7	Gravelly sandy loam.	SM, SC-SM	A-2, A-4	5-15	80-90	75-90	60-90	30-49	25-35	NP-7
	7-24	Loam, sandy loam, fine sandy loam.	SM, SC-SM	A-4	5-15	85-100	80-95	60-95	35-49	25-35	NP-7
	24-30	Gravelly sandy loam, cobbly sandy loam, sandy loam.	SM	A-2, A-4	5-15	75-95	65-95	55-95	30-49	---	NP
	30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
CoA-------------- Colvard	0-8	Loam-------------	SM, SC, SC-SM	A-2, A-4	0-5	98-100	85-100	60-85	25-49	<30	NP-10
	8-40	Fine sandy loam, sandy loam, loam.	SM, SC, SC-SM	A-2, A-4	0-5	98-100	85-100	60-85	25-49	<30	NP-10
	40-60	Loamy sand, sand, cobbly sand.	SM, SP-SM, GM, GP-GM	A-2, A-1	0-20	40-95	30-95	25-85	10-35	---	NP

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments >3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
CrF*:											
Craggey----------	0-16	Cobbly sandy loam	SM, SC-SM	A-2, A-4, A-5	15-35	80-95	75-95	60-90	25-49	<50	NP-7
	16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
CuE*:											
Cullasaja--------	0-11	Very cobbly loam	SM, GM	A-1-b, A-2-5	30-60	55-85	50-75	35-60	15-30	41-70	NP-7
	11-30	Very cobbly sandy loam, very cobbly fine sandy loam, very stony loam.	SM, GM	A-1-b, A-2-4	30-60	55-85	50-75	35-60	15-30	25-40	NP-7
	30-63	Very cobbly loamy sand, very cobbly sandy loam, very cobbly loam.	SM, SP-SM, GM, GP-GM	A-1, A-2-4	40-70	45-70	25-45	10-35	5-20	25-40	NP-7
Tusquitee--------	0-8	Cobbly loam------	SM, SC-SM	A-2, A-4, A-1-b, A-5	15-25	75-90	70-80	30-75	20-50	28-50	NP-10
	8-60	Loam, sandy loam, gravelly loam.	SC-SM, SM, ML, CL-ML	A-4	2-15	90-100	65-100	55-95	36-65	<40	NP-10
DdB-------------- Dillard	0-13	Loam-------------	ML, CL	A-4	0-2	95-100	90-100	75-95	60-85	<35	NP-10
	13-30	Clay loam, sandy clay loam.	CL, ML, SC	A-4, A-6, A-7	0-2	95-100	85-100	60-95	45-70	30-45	8-22
	30-48	Clay, clay loam	CL, CH	A-6, A-7	0-2	98-100	95-100	70-95	60-90	36-55	15-30
	48-60	Variable---------	---	---	---	---	---	---	---	---	---
DuD*, DuF*:											
Ditney-----------	0-7	Gravelly fine sandy loam.	SM, SC-SM	A-4, A-2-4, A-1-b	0-10	70-85	60-80	30-65	15-45	<30	NP-10
	7-27	Loam, sandy loam, cobbly fine sandy loam.	ML, CL-ML, SC-SM, SM	A-4, A-2-4	5-30	65-100	60-100	45-75	25-60	<30	NP-10
	27	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Unicoi-----------	0-4	Gravelly fine sandy loam.	SM, SC-SM	A-2, A-1-b	0-10	70-85	50-70	30-50	20-35	<25	NP-6
	4-12	Very cobbly loam, very cobbly sandy loam, very stony loam.	GM, GM-GC, SM, SC-SM	A-2, A-1-b	20-50	60-75	40-65	30-50	20-35	<25	NP-6
	12	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
DxF*:											
Ditney	0-7	Gravelly fine sandy loam.	SM, SC-SM	A-4, A-2-4, A-1-b	5-10	70-85	60-80	30-65	15-45	<30	NP-10
	7-27	Loam, sandy loam, cobbly fine sandy loam.	ML, CL-ML, SC-SM, SM	A-4, A-2-4	5-30	65-100	60-100	45-75	25-60	<30	NP-10
	27	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Unicoi	0-4	Gravelly fine sandy loam.	SM, SC-SM	A-2, A-1-b	5-10	70-85	50-70	30-50	20-35	<25	NP-6
	4-12	Very cobbly loam, very cobbly sandy loam.	GM, GM-GC, SM, SC-SM	A-2, A-1-b	20-50	60-75	40-65	30-50	20-35	<25	NP-6
	12	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
EcD*, EcF*:											
Edneyville	0-5	Gravelly sandy loam.	SM, SC-SM, ML, MH	A-2, A-4, A-5	0-10	75-95	65-80	60-75	30-52	25-61	NP-7
	5-60	Fine sandy loam, sandy loam, loam.	SM, SC-SM, ML, CL-ML	A-2, A-4, A-5	0-5	85-100	80-100	65-95	30-68	25-45	NP-10
Chestnut	0-5	Gravelly sandy loam.	SM, SC-SM	A-4, A-2, A-5	5-15	75-95	65-90	60-85	30-49	<50	NP-7
	5-35	Gravelly sandy loam, gravelly fine sandy loam, sandy loam.	SM, SC-SM	A-4, A-2, A-5	0-25	75-98	65-97	60-85	34-49	<45	NP-10
	35-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
EsB Elsinboro	0-12	Loam	CL, SC	A-2, A-4	0-5	85-100	80-100	50-100	25-90	21-28	4-9
	12-60	Sandy clay loam, clay loam, loam.	CL	A-6	0-5	85-100	80-100	70-100	50-95	28-40	11-20
EvD Evard	0-8	Loam	ML	A-4	0-5	90-100	90-100	85-95	60-75	<35	NP-9
	8-21	Sandy clay loam, clay loam.	SM, SC, ML, CL	A-2, A-4, A-6, A-7-6	0-2	90-100	85-100	60-95	30-70	25-45	7-18
	21-34	Sandy loam, loam, sandy clay loam.	SM, SC, ML, CL	A-2, A-4	0-5	80-100	75-100	60-95	20-55	<25	NP-9
	34-60	Sandy loam, loam	SM	A-2, A-4	0-15	75-100	70-100	60-90	15-50	---	NP
EwE*:											
Evard	0-8	Loam	ML	A-4	0-5	90-100	90-100	85-95	60-75	<35	NP-9
	8-21	Sandy clay loam, clay loam.	SM, SC, ML, CL	A-2, A-4, A-6, A-7-6	0-2	90-100	85-100	60-95	30-70	25-45	7-18
	21-34	Sandy loam, loam, sandy clay loam.	SM, SC, ML, CL	A-2, A-4	0-5	80-100	75-100	60-95	20-55	<25	NP-9
	34-60	Sandy loam, loam	SM	A-2, A-4	0-15	75-100	70-100	60-90	15-50	---	NP

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag-ments >3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct					Pct	
EwE*:											
Cowee	0-5	Loam	SM, SC-SM, ML	A-2-4, A-4, A-5, A-2	0-5	90-100	85-100	60-85	30-55	26-41	NP-12
	5-26	Gravelly sandy clay loam, loam, clay loam.	SC, CL, ML, SM	A-4, A-6, A-7, A-2	0-15	47-99	45-90	32-85	17-60	26-56	5-22
	26-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
GrD Greenlee	0-3	Very cobbly loam	GM, SM	A-2-4, A-4, A-1-b	25-65	50-100	50-100	30-85	20-45	<30	NP-7
	3-26	Very cobbly sandy loam, very cobbly sandy loam.	GM, SM	A-2-4, A-4, A-1-b	25-65	50-90	50-80	30-60	20-40	<30	NP-7
	26-70	Very cobbly sandy loam, very cobbly loamy sand.	GM, SM	A-2-4, A-4, A-1-b	25-65	50-90	45-80	30-60	15-40	<30	NP-7
	70-80	Extremely cobbly sandy loam, extremely cobbly sandy loam, extremely loamy sand.	GM, SM	A-2-4, A-1-b	40-80	50-80	45-70	20-50	15-30	<30	NP-7
HaC Hayesville	0-6	Loam	SM, SC, ML, CL	A-4	0-5	90-100	85-95	70-95	35-60	25-35	NP-10
	6-24	Clay loam, clay	ML, MH, CL, CH	A-6, A-7	0-5	90-100	85-100	70-100	55-80	36-66	11-35
	24-48	Sandy clay loam, clay loam, loam.	SM, ML, MH, CL	A-6, A-7	0-5	90-100	90-100	85-95	45-65	36-55	11-25
	48-60	Fine sandy loam, loam, sandy loam.	SM, ML, CL, SC	A-4, A-6	5-15	90-100	90-95	65-90	40-55	25-40	NP-12
HcC2 Hayesville	0-6	Clay loam	CL, SC, ML	A-4, A-6, A-7	0-5	90-100	85-100	80-95	45-65	30-50	7-18
	6-24	Clay loam, clay	ML, MH, CL, CH	A-6, A-7	0-5	90-100	85-100	70-100	55-80	36-66	11-35
	24-48	Sandy clay loam, clay loam, loam.	SM, ML, MH, CL	A-6, A-7	0-5	90-100	90-100	85-95	45-65	36-55	11-25
	48-60	Fine sandy loam, loam, sandy loam.	SM, ML, CL, SC	A-4, A-6	5-15	90-100	90-95	65-90	40-55	25-40	NP-12
HeD*:											
Hayesville	0-6	Loam	SM, SC, ML, CL	A-4	0-5	90-100	85-95	70-95	35-60	25-35	NP-10
	6-24	Clay loam, clay	ML, MH, CL, CH	A-6, A-7	0-5	90-100	85-100	70-100	55-80	36-66	11-35
	24-48	Sandy clay loam, clay loam, loam.	SM, ML, MH, CL	A-6, A-7	0-5	90-100	90-100	85-95	45-65	36-55	11-25
	48-60	Fine sandy loam, loam, sandy loam.	SM, ML, CL, SC	A-4, A-6	5-15	90-100	90-95	65-90	40-55	25-40	NP-12

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
HeD*:											
Evard-----------	0-8	Loam-------------	ML	A-4	0-5	90-100	90-100	85-95	60-75	<35	NP-9
	8-21	Sandy clay loam, clay loam.	SM, SC, ML, CL	A-2, A-4, A-6, A-7-6	0-2	90-100	85-100	60-95	30-70	25-45	7-18
	21-34	Sandy loam, loam, sandy clay loam.	SM, SC, ML, CL	A-2, A-4	0-5	80-100	75-100	60-95	20-55	<25	NP-9
	34-60	Sandy loam, loam	SM	A-2, A-4	0-15	75-100	70-100	60-90	15-50	---	NP
HrD*:											
Hayesville------	0-6	Loam-------------	SM, SC, ML, CL	A-4	0-5	90-100	85-95	70-95	35-60	25-35	NP-10
	6-24	Clay loam, clay	ML, MH, CL, CH	A-6, A-7	0-5	90-100	85-100	70-100	55-80	36-66	11-35
	24-48	Sandy clay loam, clay loam, loam.	SM, ML, MH, CL	A-6, A-7	0-5	90-100	90-100	85-95	45-65	36-55	11-25
	48-60	Fine sandy loam, loam, sandy loam.	SM, ML, CL, SC	A-4, A-6	5-15	90-100	90-95	65-90	40-55	25-40	NP-12
Evard-----------	0-8	Loam-------------	ML	A-4	0-5	90-100	90-100	85-95	60-75	<35	NP-9
	8-21	Sandy clay loam, clay loam.	SM, SC, ML, CL	A-2, A-4, A-6, A-7-6	0-2	90-100	85-100	60-95	30-70	25-45	7-18
	21-34	Sandy loam, loam, sandy clay loam.	SM, SC, ML, CL	A-2, A-4	0-5	80-100	75-100	60-95	20-55	<25	NP-9
	34-60	Sandy loam, loam	SM	A-2, A-4	0-15	75-100	70-100	60-90	15-50	---	NP
Urban land.											
HuC*:											
Hayesville------	0-6	Loam-------------	SM, SC, ML, CL	A-4	0-5	90-100	85-95	70-95	35-60	25-35	NP-10
	6-24	Clay loam, clay	ML, MH, CL, CH	A-6, A-7	0-5	90-100	85-100	70-100	55-80	36-66	11-35
	24-48	Sandy clay loam, clay loam, loam.	SM, ML, MH, CL	A-6, A-7	0-5	90-100	90-100	85-95	45-65	36-55	11-25
	48-60	Fine sandy loam, loam, sandy loam.	SM, ML, CL, SC	A-4, A-6	5-15	90-100	90-95	65-90	40-55	25-40	NP-12
Urban land.											
IoA-------------- Iotla	0-12	Sandy loam-------	SM, SC, SC-SM	A-2, A-4	0-5	95-100	75-100	60-85	25-49	<35	NP-10
	12-26	Fine sandy loam, loam, sandy loam.	SM, SC, SC-SM, ML	A-2, A-4, A-5	0-5	95-100	75-100	60-92	25-67	20-46	NP-10
	26-30	Loamy sand, sand	SM, SP-SM	A-2	0-5	95-100	85-100	55-85	10-35	---	NP
	30-50	Fine sandy loam, loam.	SM, SC, SC-SM	A-2, A-4	0-5	95-100	75-100	60-85	25-49	<35	NP-10
	50-60	Gravelly sand, sand, loamy sand.	SM, SP-SM	A-2, A-1-b, A-3	0-15	60-95	50-90	40-85	5-35	---	NP

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
JbD*, JbE*:											
Junaluska-------	0-4	Channery fine sandy loam.	SM, ML, MH, GM	A-4, A-5, A-2-4, A-7	5-15	70-96	55-91	40-80	30-55	29-56	NP-14
	4-18	Channery loam, channery clay loam.	CL, ML, SC, SM	A-6, A-7	5-15	75-100	60-100	55-95	40-73	29-50	10-20
	18-28	Channery loam, channery fine sandy loam, fine sandy loam.	SM, ML, GM	A-4	5-15	70-100	55-100	40-91	35-55	25-40	3-10
	28-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
Brasstown-------	0-6	Channery fine sandy loam.	SM, GM, ML, MH	A-4, A-5, A-7-5	2-15	70-95	70-90	40-80	35-55	30-57	NP-14
	6-30	Channery loam, loam, sandy clay loam.	CL, ML, SC, SM	A-6, A-7-6	2-15	75-100	70-100	55-97	40-73	35-50	11-20
	30-50	Channery fine sandy loam, very fine sandy loam, loam.	SM, GM, ML	A-4	2-15	70-100	70-100	40-96	35-55	25-35	NP-10
	50-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
LnC*:											
Lonon-----------	0-8	Fine sandy loam	SM, ML	A-2-4, A-4	0-5	90-100	85-100	60-85	25-65	<30	NP-7
	8-35	Loam, sandy clay loam, clay loam.	ML, SC, CL, SM	A-4, A-6	0-5	90-100	85-100	75-85	35-65	25-40	7-14
	35-43	Cobbly loam, cobbly sandy clay loam, cobbly clay loam.	ML, SC, CL, SM	A-4, A-6, A-2	10-25	85-95	75-90	65-80	30-55	25-40	7-14
	43-80	Very cobbly loam, very cobbly sandy clay loam, very cobbly clay loam.	ML, SC, CL, GC	A-4, A-6, A-2	25-45	55-80	55-75	50-70	25-65	25-40	7-14
Northcove-------	0-3	Very cobbly sandy loam.	GM, SM, SC-SM, GM-GC	A-2-4, A-4, A-1-b	25-65	50-90	50-85	30-70	20-45	<30	NP-7
	3-60	Very cobbly sandy loam, very cobbly loam, very flaggy loam.	GM, SM, SC-SM, GM-GC	A-2-4, A-4, A-1-b	25-65	50-90	50-85	30-70	20-45	<30	NP-7
	60-80	Very cobbly sandy loam, very cobbly loamy sand, extremely cobbly sandy loam.	GM, GM-GC, SM	A-2-4, A-1-b	25-80	50-85	35-60	20-50	15-30	<30	NP-7
MaD-------------- Maymead	0-5	Fine sandy loam	ML, CL-ML	A-4	0-3	80-95	75-90	65-80	50-60	<25	NP-7
	5-60	Gravelly loam, cobbly loam, cobbly sandy loam.	CL-ML, ML, SM, GM	A-4	10-25	70-90	65-85	55-75	40-60	<25	NP-7

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments >3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
MgD*:											
Maymead---------	0-5	Fine sandy loam	ML, CL-ML	A-4	0-3	80-95	75-90	65-80	50-60	<25	NP-7
	5-60	Gravelly loam, sandy loam, cobbly sandy loam.	CL-ML, ML, SM, GM	A-4	10-25	70-90	65-85	55-75	40-60	<25	NP-7
Greenlee--------	0-3	Very cobbly loam	GM, SM	A-2-4, A-4, A-1-b	25-65	50-100	50-100	30-85	20-45	<30	NP-7
	3-26	Very cobbly sandy loam, very cobbly sandy loam.	GM, SM	A-2-4, A-4, A-1-b	25-65	50-90	50-80	30-60	20-40	<30	NP-7
	26-70	Very cobbly sandy loam, very cobbly loamy sand.	GM, SM	A-2-4, A-4, A-1-b	25-65	50-90	45-80	30-60	15-40	<30	NP-7
	70-80	Extremely cobbly sandy loam, extremely cobbly loamy sand.	GM, SM	A-2-4, A-1-b	40-80	50-80	45-70	20-50	15-30	<30	NP-7
Potomac---------	0-8	Cobbly loamy sand	SM, GM, SW-SM, GW-GM	A-1, A-2	15-40	50-80	35-70	20-50	10-25	---	NP
	8-96	Very cobbly loamy sand, very gravelly loamy sand, very cobbly sand.	SM, GM, SW-SM, GW-GM	A-1, A-2	15-50	50-80	35-70	20-50	5-25	---	NP
NoE-------------- Northcove	0-3	Very cobbly sandy loam.	GM, SM, SC-SM, GM-GC	A-2-4, A-4, A-1-b	25-65	50-90	50-85	30-70	20-45	<30	NP-7
	3-60	Very cobbly sandy loam, very cobbly loam, very flaggy loam.	GM, SM, SC-SM, GM-GC	A-2-4, A-4, A-1-b	25-65	50-90	50-85	30-70	20-45	<30	NP-7
	60-80	Very cobbly sandy loam, very cobbly loamy sand, extremely cobbly sand.	GM, GM-GC, SM	A-2-4, A-1-b	25-80	50-85	35-60	20-50	15-30	<30	NP-7
PoD, PoF--------- Porters	0-9	Loam------------	ML, CL, CL-ML	A-4	0-5	85-100	80-100	70-80	51-65	<35	NP-10
	9-48	Loam, sandy loam, fine sandy loam.	SM, SC-SM, ML, CL-ML	A-2, A-4	5-25	75-99	60-99	50-90	30-70	<25	NP-7
	48-59	Weathered bedrock	---	---	---	---	---	---	---	---	---
	59	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
PtB: Potomac	0-8	Cobbly loamy sand	SM, GM, SW-SM, GW-GM	A-1, A-2	15-40	50-80	35-70	20-50	10-25	---	NP
	8-96	Very cobbly loamy sand, very gravelly loamy sand, very cobbly sand.	SM, GM, SW-SM, GW-GM	A-1, A-2	15-50	50-80	35-70	20-50	5-25	---	NP
PxA*:											
Potomac	0-8	Cobbly loamy sand	SM, GM, SW-SM, GW-GM	A-1, A-2	15-40	50-80	35-70	20-50	10-25	---	NP
	8-96	Very cobbly loamy sand, very gravelly loamy sand, very cobbly sand.	SM, GM, SW-SM, GW-GM	A-1, A-2	15-50	50-80	35-70	20-50	5-25	---	NP
Iotla	0-12	Sandy loam	SM, SC, SC-SM	A-2, A-4	0-5	95-100	75-100	60-85	25-49	<35	NP-10
	12-26	Fine sandy loam, loam, sandy loam.	SM, SC, SC-SM, ML	A-2, A-4, A-5	0-5	95-100	75-100	60-92	25-67	20-46	NP-10
	26-30	Loamy sand, sand	SM, SP-SM	A-2	0-5	95-100	85-100	55-85	10-35	---	NP
	30-50	Fine sandy loam, loam, sandy loam.	SM, SC, SC-SM	A-2, A-4	0-5	95-100	75-100	60-85	25-49	<35	NP-10
	50-60	Gravelly sand, sand, loamy sand.	SM, SP-SM	A-2, A-1-b, A-3	0-15	60-95	50-90	40-85	5-35	---	NP
RaD, RaE: Rabun	0-9	Loam	ML, CL, SM, SC	A-6, A-7, A-4	0-2	90-100	75-100	70-100	45-70	25-45	3-20
	9-72	Clay loam, clay, silty clay.	ML, CL, MH, CH	A-7	0-5	90-100	80-100	65-96	55-90	41-61	12-30
RoA: Rosman	0-11	Loam	ML, CL-ML	A-4, A-5	0	98-100	95-100	75-100	51-95	28-49	NP-10
	11-70	Loam, fine sandy loam, sandy loam.	ML, SM, SC-SM	A-2-4, A-4	0	95-100	90-100	75-100	30-85	<39	NP-8
SoD*, SoF*:											
Soco	0-3	Gravelly fine sandy loam.	SM, ML, GM, MH	A-4, A-5	5-15	70-96	55-92	40-83	36-65	20-55	NP-7
	3-28	Loam, fine sandy loam, silt loam.	SM, SC, ML, CL	A-4, A-6	0-5	85-100	80-100	65-92	36-77	25-40	NP-11
	28-48	Weathered bedrock	---	---	---	---	---	---	---	---	---
	48	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Ditney	0-7	Gravelly fine sandy loam.	SM, SC-SM	A-4, A-2-4, A-1-b	5-10	70-85	60-80	30-65	15-45	<30	NP-10
	7-27	Loam, sandy loam, cobbly fine sandy loam.	ML, CL-ML, SC-SM, SM	A-4, A-2-4	5-30	65-100	60-100	45-75	25-60	<30	NP-10
	27	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments >3 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
TaC, TaD--------- Tate	0-5	Loam-------------	ML, SM	A-4, A-6	0-5	96-100	86-98	68-98	40-80	<38	NP-13
	5-44	Clay loam, sandy clay loam, loam.	CL, ML, CL-ML, SC-SM	A-4, A-6	0-15	94-100	87-100	75-99	40-85	20-40	5-15
	44-60	Gravelly fine sandy loam, cobbly fine sandy loam, fine sandy loam.	GM, GM-GC, SM, SC-SM	A-4, A-2-4, A-2-6, A-6	5-35	40-100	40-90	35-60	30-50	<35	NP-13
Uf. Udifluvents											
Uo. Udorthents											
Ur*. Urban land											

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

(The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated)

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
AcF*:										
Ashe------------	0-7	5-20	1.35-1.60	2.0-6.0	0.10-0.13	4.5-6.0	Low----------	0.17	2	1-5
	7-24	5-20	1.35-1.60	2.0-6.0	0.10-0.14	4.5-6.0	Low----------	0.17		
	24-30	5-15	1.45-1.65	2.0-6.0	0.08-0.12	4.5-6.0	Low----------	0.17		
	30	---	---	---	---	---	-------------	----		
Cleveland-------	0-17	6-20	1.20-1.50	2.0-6.0	0.05-0.10	4.5-6.0	Low----------	0.17	1	.5-8
	17	---	---	---	---	---	-------------	----		
Rock outcrop.										
BmA--------------	0-10	3-9	1.50-1.65	6.0-20	0.07-0.11	5.1-7.8	Low----------	0.10	5	1-3
Biltmore	10-44	4-12	1.60-1.70	6.0-20	0.06-0.10	5.1-7.8	Low----------	0.10		
	44-60	---	---	---	---	---	-------------	----		
BrB2, BrC2, BrD2-	0-7	27-40	1.20-1.50	0.6-2.0	0.14-0.19	4.5-5.5	Low----------	0.32	3	.5-1
Braddock	7-60	35-55	1.20-1.50	0.6-2.0	0.12-0.17	4.5-5.5	Moderate-----	0.24		
CaD*, CaF*:										
Chestnut--------	0-5	5-20	1.35-1.60	2.0-6.0	0.08-0.12	4.5-6.0	Low----------	0.17	2	1-8
	5-35	5-20	1.35-1.60	2.0-6.0	0.08-0.12	4.5-6.0	Low----------	0.15		
	35-60	---	---	---	---	---	-------------	----		
Ashe------------	0-7	5-20	1.35-1.60	2.0-6.0	0.10-0.13	4.5-6.0	Low----------	0.17	2	1-5
	7-24	5-20	1.35-1.60	2.0-6.0	0.10-0.14	4.5-6.0	Low----------	0.17		
	24-30	5-15	1.45-1.65	2.0-6.0	0.08-0.12	4.5-6.0	Low----------	0.17		
	30	---	---	---	---	---	-------------	----		
CoA--------------	0-8	8-18	1.45-1.65	2.0-6.0	0.09-0.12	5.1-7.8	Low----------	0.15	4	1-2
Colvard	8-40	8-18	1.45-1.65	2.0-6.0	0.09-0.12	5.1-7.8	Low----------	0.10		
	40-60	1-12	1.60-1.75	6.0-20	0.06-0.10	5.1-7.8	Low----------	0.10		
CrF*:										
Craggey---------	0-16	8-20	1.10-1.30	2.0-6.0	0.10-0.15	4.5-6.0	Low----------	0.15	1	8-20
	16	---	---	---	---	---	-------------	----		
Rock outcrop.										
CuE*:										
Cullasaja-------	0-11	7-20	0.50-1.20	2.0-6.0	0.09-0.12	4.5-6.0	Low----------	0.05	5	5-18
	11-30	5-20	1.00-1.60	2.0-6.0	0.07-0.10	4.5-6.0	Low----------	0.05		
	30-63	2-15	1.00-1.60	2.0-6.0	0.03-0.06	4.5-6.0	Low----------	0.05		
Tusquitee-------	0-8	7-20	1.20-1.40	2.0-6.0	0.11-0.18	4.5-6.5	Low----------	0.17	5	3-8
	8-60	7-20	1.30-1.60	2.0-6.0	0.11-0.21	4.5-6.0	Low----------	0.20		
DdB--------------	0-13	7-25	1.20-1.50	0.6-2.0	0.15-0.20	5.1-6.0	Low----------	0.32	4	.5-5
Dillard	13-30	18-35	1.40-1.60	0.6-2.0	0.12-0.16	4.5-5.5	Low----------	0.28		
	30-48	30-50	1.40-1.60	0.2-0.6	0.14-0.18	4.5-5.5	Moderate-----	0.28		
	48-60	---	---	0.00-0.2	---	---	-------------	----		
DuD*, DuF*:										
Ditney----------	0-7	5-18	1.50-1.65	2.0-6.0	0.07-0.12	3.6-5.5	Low----------	0.17	2	1-3
	7-27	5-18	1.50-1.65	2.0-6.0	0.05-0.13	3.6-5.5	Low----------	0.17		
	27	---	---	0.00-0.01	---	---	-------------	----		

See footnote at end of table.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
DuD*, DuF*:										
Unicoi----------	0-4	5-20	1.45-1.55	2.0-6.0	0.08-0.12	3.6-5.5	Low----------	0.20	1	.5-2
	4-12	5-20	1.45-1.60	2.0-6.0	0.04-0.09	3.6-5.5	Low----------	0.15		
	12	---	---	0.00-0.01	---	---	-------------	----		
DxF*:										
Ditney----------	0-7	5-18	1.50-1.65	2.0-6.0	0.07-0.12	3.6-5.5	Low----------	0.17	2	1-3
	7-27	5-18	1.50-1.65	2.0-6.0	0.05-0.13	3.6-5.5	Low----------	0.17		
	27	---	---	0.00-0.01	---	---	-------------	----		
Unicoi----------	0-4	5-20	1.45-1.55	2.0-6.0	0.08-0.12	3.6-5.5	Low----------	0.20	1	.5-2
	4-12	5-20	1.45-1.60	2.0-6.0	0.04-0.09	3.6-5.5	Low----------	0.15		
	12	---	---	0.00-0.01	---	---	-------------	----		
Rock outcrop.										
EcD*, EcF*:										
Edneyville------	0-5	5-18	1.40-1.60	2.0-6.0	0.08-0.13	4.5-6.0	Low----------	0.17	4	1-8
	5-60	7-20	1.40-1.60	2.0-6.0	0.10-0.16	4.5-6.0	Low----------	0.20		
Chestnut--------	0-5	5-20	1.35-1.60	2.0-6.0	0.08-0.12	3.6-6.0	Low----------	0.17	2	1-8
	5-35	5-25	1.35-1.60	2.0-6.0	0.08-0.12	3.6-6.0	Low----------	0.15		
	35-60	---	---	---	---	---	-------------	----		
EsB-------------- Elsinboro	0-12	7-27	1.25-1.40	0.6-2.0	0.10-0.18	4.5-5.5	Low----------	0.37	4	1-3
	12-60	18-35	1.30-1.50	0.6-2.0	0.12-0.16	4.5-5.5	Low----------	0.28		
EvD-------------- Evard	0-8	7-25	1.30-1.50	0.6-2.0	0.15-0.20	4.5-6.0	Low----------	0.28	5	1-5
	8-21	18-35	1.30-1.50	0.6-2.0	0.12-0.16	4.5-6.0	Low----------	0.24		
	21-34	12-30	1.20-1.40	0.6-2.0	0.10-0.25	4.5-6.0	Low----------	0.24		
	34-60	5-20	1.20-1.40	0.6-2.0	0.08-0.12	4.5-6.0	Low----------	0.24		
EwE*:										
Evard-----------	0-8	7-25	1.30-1.50	0.6-2.0	0.15-0.20	4.5-6.0	Low----------	0.28	5	1-5
	8-21	18-35	1.30-1.50	0.6-2.0	0.12-0.16	4.5-6.0	Low----------	0.24		
	21-34	12-30	1.20-1.40	0.6-2.0	0.10-0.25	4.5-6.0	Low----------	0.24		
	34-60	5-20	1.20-1.40	0.6-2.0	0.08-0.12	4.5-6.0	Low----------	0.24		
Cowee-----------	0-5	7-25	1.25-1.60	2.0-6.0	0.12-0.20	4.5-6.0	Low----------	0.28	2	1-5
	5-26	18-35	1.30-1.60	0.6-2.0	0.12-0.18	4.5-6.0	Low----------	0.24		
	26-60	---	---	---	---	---	-------------	----		
GrD-------------- Greenlee	0-3	5-25	1.30-1.50	2.0-6.0	0.06-0.11	3.6-6.0	Low----------	0.10	5	2-5
	3-26	5-25	1.40-1.60	2.0-6.0	0.05-0.10	3.6-6.0	Low----------	0.10		
	26-70	1-18	1.40-1.60	2.0-6.0	0.04-0.10	3.6-6.0	Low----------	0.10		
	70-80	1-18	1.40-1.60	2.0-6.0	0.03-0.05	3.6-6.0	Low----------	0.10		
HaC-------------- Hayesville	0-6	10-25	1.35-1.60	2.0-6.0	0.12-0.20	4.5-6.5	Low----------	0.20	5	1-3
	6-24	30-50	1.20-1.35	0.6-2.0	0.15-0.20	4.5-6.0	Low----------	0.24		
	24-48	20-40	1.30-1.40	0.6-2.0	0.12-0.20	4.5-6.0	Low----------	0.20		
	48-60	5-25	1.45-1.65	2.0-6.0	0.11-0.15	4.5-6.0	Low----------	0.17		
HcC2------------- Hayesville	0-6	27-40	1.30-1.50	0.6-2.0	0.12-0.20	4.5-6.5	Low----------	0.24	5	1-3
	6-24	30-50	1.20-1.35	0.6-2.0	0.15-0.20	4.5-6.0	Low----------	0.24		
	24-48	20-40	1.30-1.40	0.6-2.0	0.12-0.20	4.5-6.0	Low----------	0.20		
	48-60	5-25	1.45-1.65	2.0-6.0	0.11-0.15	4.5-6.0	Low----------	0.17		
HeD*:										
Hayesville------	0-6	10-25	1.35-1.60	2.0-6.0	0.12-0.20	4.5-6.5	Low----------	0.20	5	1-3
	6-24	30-50	1.20-1.35	0.6-2.0	0.15-0.20	4.5-6.0	Low----------	0.24		
	24-48	20-40	1.30-1.40	0.6-2.0	0.12-0.20	4.5-6.0	Low----------	0.20		
	48-60	5-25	1.45-1.65	2.0-6.0	0.11-0.15	4.5-6.0	Low----------	0.17		

See footnote at end of table.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
HeD*:										
Evard-----------	0-8	7-25	1.30-1.50	0.6-2.0	0.15-0.20	4.5-6.0	Low-----------	0.28	5	1-5
	8-21	18-35	1.30-1.50	0.6-2.0	0.12-0.16	4.5-6.0	Low-----------	0.24		
	21-34	12-30	1.20-1.40	0.6-2.0	0.10-0.25	4.5-6.0	Low-----------	0.24		
	34-60	5-20	1.20-1.40	0.6-2.0	0.08-0.12	4.5-6.0	Low-----------	0.24		
HrD*:										
Hayesville------	0-6	10-25	1.35-1.60	2.0-6.0	0.12-0.20	4.5-6.5	Low-----------	0.20	5	1-3
	6-24	30-50	1.20-1.35	0.6-2.0	0.15-0.20	4.5-6.0	Low-----------	0.24		
	24-48	20-40	1.30-1.40	0.6-2.0	0.12-0.20	4.5-6.0	Low-----------	0.20		
	48-60	5-25	1.45-1.65	2.0-6.0	0.11-0.15	4.5-6.0	Low-----------	0.17		
Evard-----------	0-8	7-25	1.30-1.50	0.6-2.0	0.15-0.20	4.5-6.0	Low-----------	0.28	5	1-5
	8-21	18-35	1.30-1.50	0.6-2.0	0.12-0.16	4.5-6.0	Low-----------	0.24		
	21-34	12-30	1.20-1.40	0.6-2.0	0.10-0.25	4.5-6.0	Low-----------	0.24		
	34-60	5-20	1.20-1.40	0.6-2.0	0.08-0.12	4.5-6.0	Low-----------	0.24		
Urban land.										
HuC*:										
Hayesville------	0-6	10-25	1.35-1.60	2.0-6.0	0.12-0.20	4.5-6.5	Low-----------	0.20	5	1-3
	6-24	30-50	1.20-1.35	0.6-2.0	0.15-0.20	4.5-6.0	Low-----------	0.24		
	24-48	20-40	1.30-1.40	0.6-2.0	0.12-0.20	4.5-6.0	Low-----------	0.20		
	48-60	5-25	1.45-1.65	2.0-6.0	0.11-0.15	4.5-6.0	Low-----------	0.17		
Urban land.										
IoA-------------- Iotla	0-12	12-18	1.45-1.65	2.0-6.0	0.10-0.15	5.1-7.3	Low-----------	0.15	5	2-5
	12-26	12-23	1.45-1.65	2.0-6.0	0.10-0.15	5.1-7.3	Low-----------	0.15		
	26-30	4-12	1.60-1.75	6.0-20	0.06-0.10	5.1-7.3	Low-----------	0.10		
	30-50	12-18	1.45-1.65	2.0-6.0	0.10-0.15	5.1-7.3	Low-----------	0.15		
	50-60	1-12	1.60-1.75	6.0-2.0	0.03-0.10	5.1-7.3	Low-----------	0.10		
JbD*, JbE*:										
Junaluska-------	0-4	5-18	1.35-1.60	2.0-6.0	0.10-0.15	3.6-6.0	Low-----------	0.15	2	1-5
	4-18	18-35	1.30-1.65	0.6-2.0	0.12-0.18	3.6-6.0	Low-----------	0.15		
	18-28	15-20	1.35-1.65	2.0-6.0	0.10-0.15	3.6-6.0	Low-----------	0.15		
	28-60	---	---	---	---	---	-------------	----		
Brasstown-------	0-6	5-18	1.00-1.40	2.0-6.0	0.10-0.15	3.6-6.0	Low-----------	0.15	3	1-5
	6-30	18-35	1.35-1.60	0.6-2.0	0.12-0.18	3.6-6.0	Low-----------	0.15		
	30-50	8-20	1.40-1.65	0.6-2.0	0.10-0.15	3.6-6.0	Low-----------	0.15		
	50-60	---	---	---	---	---	-------------	----		
LnC*:										
Lonon-----------	0-8	7-20	1.35-1.60	2.0-6.0	0.14-0.20	3.6-6.0	Low-----------	0.24	5	.5-2
	8-35	18-35	1.30-1.50	0.6-2.0	0.12-0.20	3.6-6.0	Low-----------	0.24		
	35-43	18-35	1.30-1.50	0.6-2.0	0.09-0.15	3.6-6.0	Low-----------	0.15		
	43-80	18-35	1.30-1.50	0.6-2.0	0.09-0.15	3.6-6.0	Low-----------	0.15		
Northcove-------	0-3	5-18	1.30-1.50	2.0-6.0	0.06-0.11	3.6-6.0	Low-----------	0.10	5	0-2
	3-60	5-18	1.40-1.60	2.0-6.0	0.06-0.11	3.6-6.0	Low-----------	0.10		
	60-80	1-18	1.40-1.60	2.0-6.0	0.03-0.05	3.6-6.0	Low-----------	0.10		
MaD-------------- Maymead	0-5	8-18	1.40-1.55	2.0-6.0	0.15-0.18	4.5-5.5	Low-----------	0.24	5	1-3
	5-60	8-18	1.40-1.55	2.0-6.0	0.13-0.18	4.5-5.5	Low-----------	0.17		
MgD*:										
Maymead---------	0-5	8-18	1.40-1.55	2.0-6.0	0.15-0.18	4.5-5.5	Low-----------	0.24	5	1-3
	5-60	8-18	1.40-1.55	2.0-6.0	0.13-0.18	4.5-5.5	Low-----------	0.17		

See footnote at end of table.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
MgD*:										
Greenlee---------	0-3	5-25	1.30-1.50	2.0-6.0	0.06-0.11	3.6-5.5	Low-----------	0.10	5	2-5
	3-26	5-25	1.40-1.60	2.0-6.0	0.05-0.10	3.6-6.0	Low-----------	0.10		
	26-70	1-18	1.40-1.60	2.0-6.0	0.04-0.10	3.6-6.0	Low-----------	0.10		
	70-80	1-18	1.40-1.60	2.0-6.0	0.03-0.05	3.6-6.0	Low-----------	0.10		
Potomac---------	0-8	4-10	1.30-1.60	>6.0	0.04-0.08	5.1-7.8	Low-----------	0.17	3	0-2
	8-96	1-10	1.30-1.60	>6.0	0.03-0.06	5.1-7.8	Low-----------	0.17		
NoE-------------- Northcove	0-3	5-18	1.30-1.50	2.0-6.0	0.06-0.11	3.6-6.0	Low-----------	0.10	5	0-2
	3-60	5-18	1.40-1.60	2.0-6.0	0.06-0.11	3.6-6.0	Low-----------	0.10		
	60-80	1-18	1.40-1.60	2.0-6.0	0.03-0.05	3.6-6.0	Low-----------	0.10		
PoD, PoF--------- Porters	0-9	7-20	1.40-1.60	2.0-6.0	0.16-0.20	4.5-6.5	Low-----------	0.28	3	3-8
	9-48	7-20	1.40-1.60	2.0-6.0	0.10-0.20	4.5-6.5	Low-----------	0.24		
	48-59	---	---	---	---	---	-------------	----		
	59	---	---	---	---	---	-------------	----		
PtB-------------- Potomac	0-8	4-10	1.30-1.60	>6.0	0.04-0.08	5.1-7.8	Low-----------	0.17	3	0-2
	8-96	1-10	1.30-1.60	>6.0	0.03-0.06	5.1-7.8	Low-----------	0.17		
PxA*:										
Potomac---------	0-8	4-10	1.30-1.60	>6.0	0.04-0.08	5.1-7.8	Low-----------	0.17	3	0-2
	8-96	1-10	1.30-1.60	>6.0	0.03-0.06	5.1-7.8	Low-----------	0.17		
Iotla-----------	0-12	5-18	1.45-1.65	2.0-6.0	0.10-0.15	5.1-7.3	Low-----------	0.15	5	2-5
	12-26	12-23	1.45-1.65	2.0-6.0	0.10-0.15	5.1-7.3	Low-----------	0.15		
	26-30	4-12	1.60-1.75	6.0-20	0.06-0.10	5.1-7.3	Low-----------	0.10		
	30-50	12-18	1.45-1.65	2.0-6.0	0.10-0.15	5.1-7.3	Low-----------	0.15		
	50-60	1-12	1.60-1.75	6.0-2.0	0.30-0.10	5.1-7.3	Low-----------	0.10		
RaD, RaE--------- Rabun	0-9	18-35	1.30-1.55	0.6-2.0	0.12-0.18	5.1-6.5	Low-----------	0.32	4	1-2
	9-72	35-80	1.20-1.50	0.6-2.0	0.12-0.18	5.1-6.5	Low-----------	0.28		
RoA-------------- Rosman	0-11	7-18	1.25-1.40	2.0-6.0	0.15-0.24	5.1-6.5	Low-----------	0.28	5	2-8
	11-70	7-18	1.25-1.50	2.0-6.0	0.10-0.18	5.1-6.5	Low-----------	0.24		
SoD*, SoF*:										
Soco------------	0-3	5-18	1.35-1.60	2.0-6.0	0.11-0.17	3.6-5.5	Low-----------	0.15	2	1-8
	3-28	5-18	1.35-1.60	2.0-6.0	0.12-0.20	3.6-5.5	Low-----------	0.32		
	28-48	---	---	---	---	---	-------------	----		
	48	---	---	---	---	---	-------------	----		
Ditney----------	0-7	5-18	1.50-1.65	2.0-6.0	0.07-0.12	3.6-5.5	Low-----------	0.17	2	1-3
	7-27	5-18	1.50-1.65	2.0-6.0	0.05-0.13	3.6-5.5	Low-----------	0.17		
	27	---	---	0.00-0.01	---	---	-------------	----		
TaC, TaD--------- Tate	0-5	7-25	1.35-1.60	2.0-6.0	0.17-0.19	4.5-6.5	Low-----------	0.24	5	1-3
	5-44	18-35	1.30-1.45	0.6-2.0	0.17-0.19	4.5-6.5	Low-----------	0.28		
	44-60	5-25	1.35-1.60	2.0-6.0	0.12-0.15	4.5-5.5	Low-----------	0.17		
Uf--------------- Udifluvents	0-10	3-9	1.50-1.65	6.0-20	0.07-0.11	5.1-7.8	Low-----------	0.10	5	1-3
	10-50	4-12	1.60-1.70	6.0-20	0.06-0.10	5.1-7.8	Low-----------	0.10		
	50-60	---	---	---	---	---	-------------	----		
Uo. Udorthents										
Ur*. Urban land										

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--SOIL AND WATER FEATURES

("Flooding" and "water table" and terms such as "rare," "brief," and "apparent" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Soil name and map symbol	Hydro- logic group	Flooding		High water table			Bedrock		Risk of corrosion	
		Frequency	Duration	Depth	Kind	Months	Depth	Hard- ness	Uncoated steel	Concrete
				Ft			In			
AcF*:										
Ashe	B	None	---	>6.0	---	---	20-40	Hard	Low	High.
Cleveland	C	None	---	>6.0	---	---	10-20	Hard	Low	High.
Rock outcrop.										
BmA Biltmore	A	Occasional	Brief	3.5-6.0	Apparent	Dec-May	>60	---	Low	Moderate.
BrB2, BrC2, BrD2 Braddock	B	None	---	>6.0	---	---	>60	---	High	Moderate.
CaD*, CaF*:										
Chestnut	B	None	---	>6.0	---	---	20-40	Soft	Low	High.
Ashe	B	None	---	>6.0	---	---	20-40	Hard	Low	High.
CoA Colvard	B	Occasional	Very brief	4.0-6.0	Apparent	Dec-Apr	>60	---	Low	Moderate.
CrF*:										
Craggey	D	None	---	>6.0	---	---	10-20	Hard	High	High.
Rock outcrop.										
CuE*:										
Cullasaja	B	None	---	>6.0	---	---	>60	---	High	High.
Tusquitee	B	None	---	>6.0	---	---	>60	---	Moderate	Moderate.
DdB Dillard	C	Rare	---	2.0-3.0	Apparent	Dec-Apr	>60	---	Moderate	High.
DuD*, DuF*:										
Ditney	C	None	---	>6.0	---	---	20-40	Hard	Low	Moderate.
Unicoi	C	None	---	>6.0	---	---	10-20	Hard	Low	Moderate.
DxF*:										
Ditney	C	None	---	>6.0	---	---	20-40	Hard	Low	Moderate.
Unicoi	C	None	---	>6.0	---	---	10-20	Hard	Low	Moderate.
Rock outcrop.										
EcD*, EcF*:										
Edneyville	B	None	---	>6.0	---	---	>60	---	Low	High.
Chestnut	B	None	---	>6.0	---	---	20-40	Soft	Low	High.
EsB Elsinboro	B	Rare	---	>5.0	Apparent	Dec-Apr	>60	---	Moderate	High.
EvD Evard	B	None	---	>6.0	---	---	>60	---	Moderate	High.

See footnote at end of table.

TABLE 15.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding: Frequency	Flooding: Duration	High water table: Depth	High water table: Kind	High water table: Months	Bedrock: Depth	Bedrock: Hard-ness	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
				Ft			In			
EwE*:										
Evard	B	None	---	>6.0	---	---	>60	---	Moderate	High.
Cowee	B	None	---	>6.0	---	---	20-40	Soft	Moderate	High.
GrD: Greenlee	B	None	---	>6.0	---	---	>60	---	Low	High.
HaC, HcC2: Hayesville	B	None	---	>6.0	---	---	>60	---	Moderate	Moderate.
HeD*:										
Hayesville	B	None	---	>6.0	---	---	>60	---	Moderate	Moderate.
Evard	B	None	---	>6.0	---	---	>60	---	Moderate	High.
HrD*:										
Hayesville	B	None	---	>6.0	---	---	>60	---	Moderate	Moderate.
Evard	B	None	---	>6.0	---	---	>60	---	Moderate	High.
Urban land.										
HuC*:										
Hayesville	B	None	---	>6.0	---	---	>60	---	Moderate	Moderate.
Urban land.										
IoA: Iotla	B	Occasional	Brief	1.5-3.5	Apparent	Dec-May	>60	---	Low	Moderate.
JbD*, JbE*:										
Junaluska	B	None	---	>6.0	---	---	20-40	Soft	Moderate	High.
Brasstown	B	None	---	>6.0	---	---	40-60	Soft	Moderate	High.
LnC*:										
Lonon	B	None	---	>6.0	---	---	>60	---	Low	High.
Northcove	B	None	---	>6.0	---	---	>60	---	Low	High.
MaD: Maymead	B	None	---	>6.0	---	---	>60	---	Low	Moderate.
MgD*:										
Maymead	B	None	---	>6.0	---	---	>60	---	Low	Moderate.
Greenlee	B	None	---	>6.0	---	---	>60	---	Low	High.
Potomac	A	Frequent	Brief	4.0-6.0	Apparent	---	>60	---	Low	Moderate.
NoE: Northcove	B	None	---	>6.0	---	---	>60	---	Low	High.
PoD, PoF: Porters	B	None	---	>6.0	---	---	40-60	Hard	Low	High.
PtB: Potomac	A	Frequent	Brief	4.0-6.0	Apparent	---	>60	---	Low	Moderate.

See footnote at end of table.

TABLE 15.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding		High water table			Bedrock		Risk of corrosion	
		Frequency	Duration	Depth	Kind	Months	Depth	Hardness	Uncoated steel	Concrete
				Ft			In			
PxA*:										
Potomac----------	A	Frequent----	Brief-----	4.0-6.0	Apparent	---	>60	---	Low--------	Moderate.
Iotla------------	B	Frequent----	Brief-----	1.5-3.5	Apparent	Dec-May	>60	---	Low--------	Moderate.
RaD, RaE---------- Rabun	B	None--------	---	>6.0	---	---	>60	---	High-------	Moderate.
RoA--------------- Rosman	B	Occasional	Very brief	4.0-5.0	Apparent	Jan-Apr	>60	---	Moderate---	Moderate.
SoD*, SoF*:										
Soco-------------	B	None--------	---	>6.0	---	---	20-40	Soft	Moderate---	High.
Ditney-----------	C	None--------	---	>6.0	---	---	20-40	Hard	Low--------	Moderate.
TaC, TaD---------- Tate	B	None--------	---	>6.0	---	---	>60	---	Moderate---	Moderate.
Uf---------------- Udifluvents	A	Occasional	Brief-----	3.5-6.0	Apparent	Dec-May	>60	---	Low--------	Moderate.
Uo. Udorthents										
Ur*. Urban land										

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--ENGINEERING INDEX TEST DATA

(Dashes indicate that data were not available. LL means liquid limit; PI, plasticity index; MD, maximum dry density; OM, optimum moisture; and NP, nonplastic. The soils are the typical pedons for the soil series in the survey area unless noted. For the location of the pedons see "Soil Series and Their Morphology" or refer to the footnotes)

Soil name, report number, horizon, and depth in inches	Classification		Grain-size distribution											LL	PI	Moisture density	
			Percentage passing sieve--								Percentage smaller than--					MD	OM
	AASHTO	Unified	3 in.	2 in.	3/4 inch	3/8 inch	No. 4	No. 10	No. 40	No. 200	.02 mm	.005 mm	.002 mm	Pct		Lb/cu ft	Pct
Braddock clay loam: (S83NC-111-1)																	
Ap---------- 0-7	A-6(10)	CL	---	---	---	---	100	99	97	79	55	43	35	37	16	104	19
Bt1--------- 7-25	A-7-6(18)	CH	---	---	---	---	100	99	98	85	70	60	56	54	28	95	26
Bt2--------- 25-46	A-7-5(17)	MH	---	---	---	---	100	100	99	86	69	57	54	62	23	90	28
Dillard loam[1]: (S83NC-111-3)																	
Bt2--------- 16-25	A-7-6(6)	SC	---	---	---	---	98	95	82	47	40	26	25	44	19	110	17
Btg--------- 25-33	A-7-6(6)	SC	---	---	---	---	97	94	80	45	38	28	27	45	22	108	16
Iotla sandy loam[2]: (S83NC-111-2)																	
Ap---------- 0-10	A-4(1)	SC	---	---	---	---	100	100	85	38	29	16	14	32	10	110	16
C1---------- 10-26	A-7-5(10)	ML	---	---	---	---	100	100	92	67	51	42	23	46	15	93	26
Junaluska channery fine sandy loam[3,4]: (S83NC-111-5)																	
A1---------- 0-2	A-2-4(0)	ML	---	---	---	---	81	79	76	31	11	7	6	29	NP	97	17
A2---------- 2-8	A-2-4(0)	ML	---	---	---	---	85	82	80	32	14	9	8	19	NP	116	11
Bt1--------- 8-12	A-4(2)	CL-ML	---	---	---	---	96	93	91	45	27	21	21	25	4	114	14
Bt2--------- 12-24	A-7-6(14)	CL	---	---	---	---	99	97	95	62	46	39	37	48	37	99	23
BC---------- 24-34	A-6(4)	CL	---	---	---	---	98	95	92	50	35	27	26	36	14	108	18

1 Location of sample is about 2.2 miles northwest of Dysartsville on North Carolina Highway 226, northeast 0.8 mile on Secondary Road 1758, southeast 0.8 mile on Secondary Road 1768, northeast 0.4 mile on Secondary Road 1767, about 150 feet east of the road, in a field.

2 Location of sample is 4.9 miles southwest of Interstate 40 on North Carolina Highway 226, east 2.1 miles on Secondary Road 1763, east 0.3 mile on Secondary Road 1764, about 300 feet west of South Muddy Creek, in a field.

3 Location of sample is about 1.0 mile east of Hawkins on Secondary Road 1501, about 3.0 miles northeast on Secondary Road 1552 to a logging road, about 1.5 miles northwest on the logging road, 35 feet east of the road, in a forest.

4 The plasticity index and percent passing the .002 seive in the Bt2 horizon are higher than allowed for the series. These differences do not significantly affect use and management.

TABLE 17.--CLASSIFICATION OF THE SOILS

(An asterisk in the first column indicates that the soil is a taxadjunct to the series. See text for a description of those characteristics of the soil that are outside the range of the series)

Soil name	Family or higher taxonomic class
Ashe	Coarse-loamy, mixed, mesic Typic Dystrochrepts
Biltmore	Mixed, mesic Typic Udipsamments
Braddock	Clayey, mixed, mesic Typic Hapludults
Brasstown	Fine-loamy, mixed, mesic Typic Hapludults
Chestnut	Coarse-loamy, mixed, mesic Typic Dystrochrepts
Cleveland	Loamy, mixed, mesic Lithic Dystrochrepts
Colvard	Coarse-loamy, mixed, nonacid, mesic Typic Udifluvents
Cowee	Fine-loamy, mixed, mesic Typic Hapludults
Craggey	Loamy, mixed, frigid Lithic Haplumbrepts
Cullasaja	Loamy-skeletal, mixed, mesic Typic Haplumbrepts
Dillard	Fine-loamy, mixed, mesic Aquic Hapludults
Ditney	Coarse-loamy, mixed, mesic Typic Dystrochrepts
Edneyville	Coarse-loamy, mixed, mesic Typic Dystrochrepts
Elsinboro	Fine-loamy, mixed, mesic Typic Hapludults
Evard	Fine-loamy, oxidic, mesic Typic Hapludults
Greenlee	Loamy-skeletal, mixed, mesic Typic Dystrochrepts
Hayesville	Clayey, kaolinitic, mesic Typic Kanhapludults
Iotla	Coarse-loamy, mixed, nonacid, mesic Aquic Udifluvents
Junaluska	Fine-loamy, mixed, mesic Typic Hapludults
Lonon	Fine-loamy, mixed, mesic Typic Hapludults
Maymead	Coarse-loamy, mixed, mesic Typic Dystrochrepts
Northcove	Loamy-skeletal, mixed, mesic Typic Dystrochrepts
Porters	Coarse-loamy, mixed, mesic Umbric Dystrochrepts
Potomac	Sandy-skeletal, mixed, mesic Typic Udifluvents
*Rabun	Clayey, kaolinitic, mesic Typic Rhodudults
Rosman	Coarse-loamy, mixed, mesic Fluventic Haplumbrepts
Soco	Coarse-loamy, mixed, mesic Typic Dystrochrepts
Tate	Fine-loamy, mixed, mesic Typic Hapludults
Tusquitee	Coarse-loamy, mixed, mesic Umbric Dystrochrepts
Udifluvents	Udifluvents
Udorthents	Udorthents
Unicoi	Loamy-skeletal, mixed, mesic Lithic Dystrochrepts

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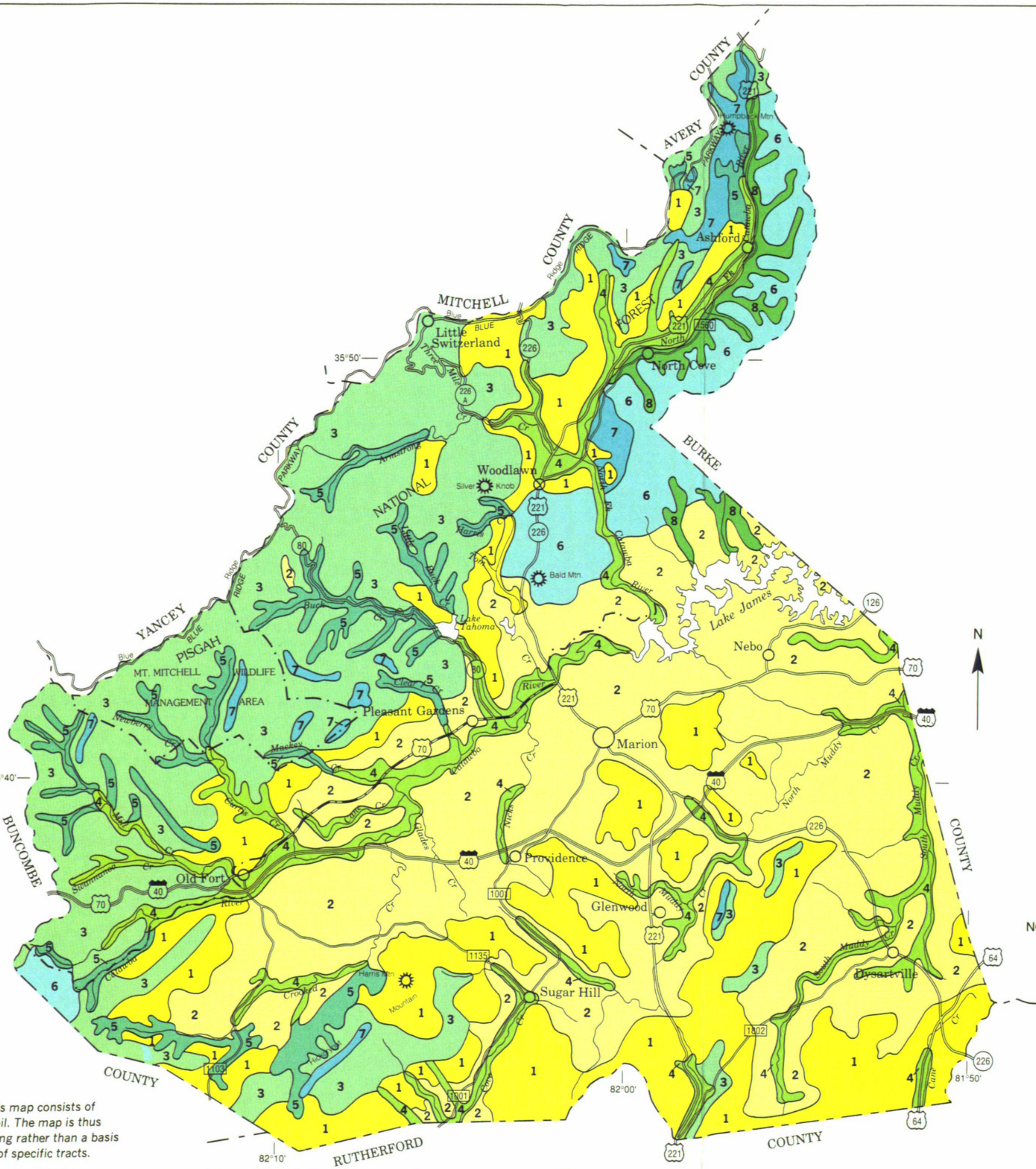


SOIL LEGEND*

1	EVARD-COWEE
2	HAYESVILLE-EVARD
3	CHESTNUT-ASHE-EDNEYVILLE
4	IOTLA-BRADDOCK-ROSMAN-POTOMAC
5	TATE-GREENLEE
6	DITNEY-JUNALUSKA-BRASSTOWN-UNICOI
7	ASHE-CLEVELAND-ROCK OUTCROP
8	NORTHCOVE-LONON

* The units on this legend are described in the text under the heading "General Soil Map Units."

Compiled 1993

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
FOREST SERVICE
NORTH CAROLINA DEPARTMENT OF ENVIRONMENT, HEALTH, AND NATURAL RESOURCES
NORTH CAROLINA AGRICULTURAL RESEARCH SERVICE
NORTH CAROLINA COOPERATIVE EXTENSION SERVICE
MCDOWELL COUNTY SOIL AND WATER CONSERVATION DISTRICT
MCDOWELL COUNTY BOARD OF COMMISSIONERS

GENERAL SOIL MAP

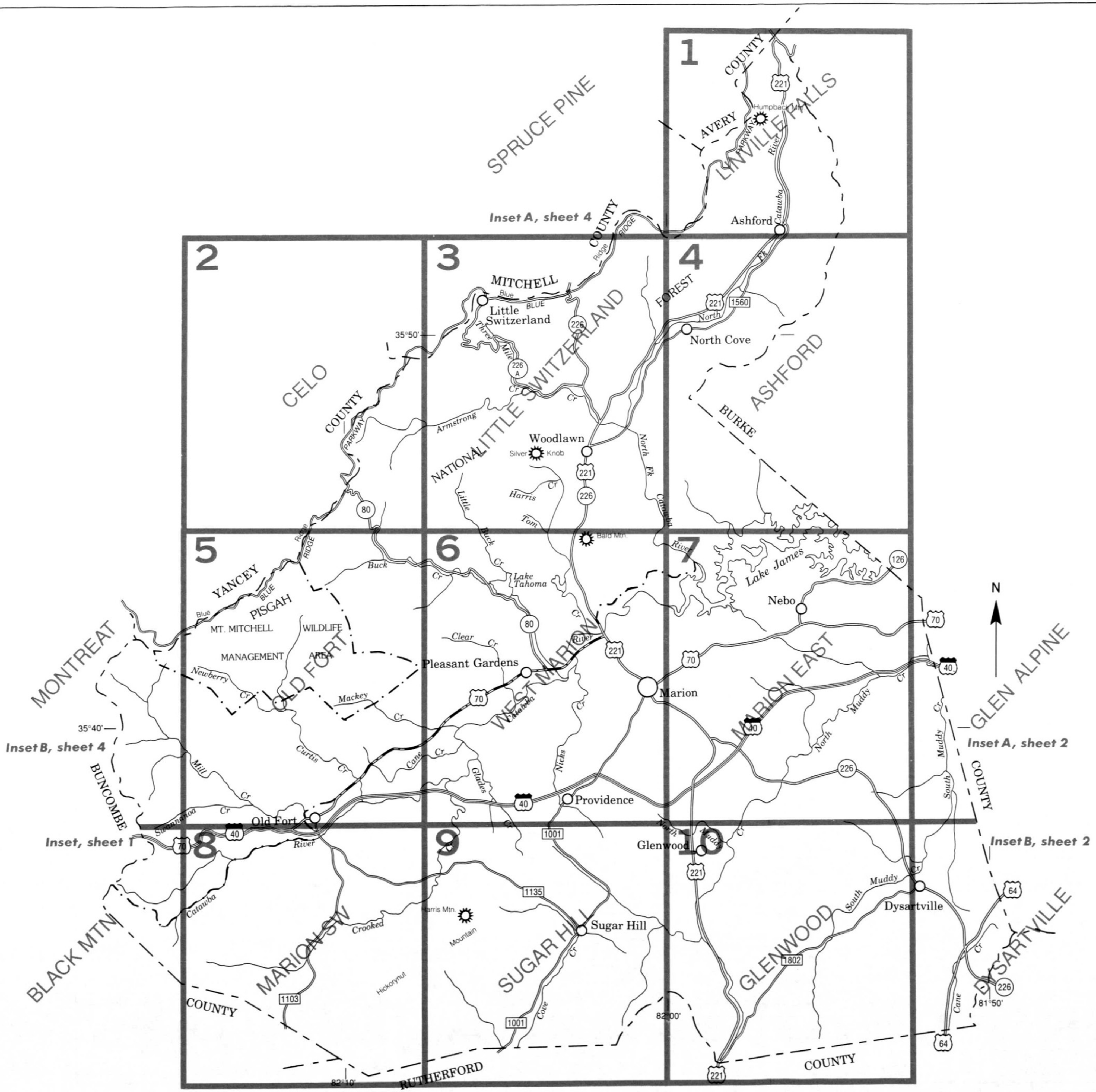
MCDOWELL COUNTY, NORTH CAROLINA

Scale 1:190,080

1 0 1 2 3 Mi

1 0 3 6 Km

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.



INDEX TO MAP SHEETS

MCDOWELL COUNTY, NORTH CAROLINA

Scale 1:190,080

1 0 1 2 3 Mi

1 0 3 6 Km

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE AND FOREST SERVICE

MCDOWELL COUNTY, NORTH CAROLINA

NORTH CAROLINA DEPARTMENT OF ENVIRONMENT, HEALTH, AND NATURAL RESOURCES
NORTH CAROLINA AGRICULTURAL RESEARCH SERVICE
NORTH CAROLINA COOPERATIVE EXTENSION SERVICE
MCDOWELL COUNTY SOIL AND WATER CONSERVATION DISTRICT
MCDOWELL COUNTY BOARD OF COMMISSIONERS

SOIL LEGEND

Map unit symbols and names are alphabetical. Map unit symbols are letters or a combination of letters and a number. The first capital letter is the initial one of the map unit name. The second letter is lowercase. The third letter is capitalized and indicates the class of slope. A final number of 2 indicates that the soil is moderately eroded.

SYMBOL	NAME
AcF	Ashe-Cleveland- Rock outcrop complex, 60 to 95 percent slopes
BmA	Biltmore loamy fine sand, 0 to 3 percent slopes, occasionally flooded
BrB2	Braddock clay loam, 2 to 6 percent slopes, eroded
BrC2	Braddock clay loam, 6 to 15 percent slopes, eroded
BrD2	Braddock clay loam, 15 to 25 percent slopes, eroded
CaD	Chestnut-Ashe complex, 10 to 25 percent slopes, stony
CaF	Chestnut-Ashe complex, 25 to 80 percent slopes, stony
CoA	Colvard loam, 0 to 2 percent slopes, occasionally flooded
CrF	Craggey-Rock outcrop complex, 40 to 90 percent slopes
CuE	Cullasaja-Tusquitee complex, 10 to 45 percent slopes
DdB	Dillard loam, 1 to 4 percent slopes, rarely flooded
DuD	Ditney-Unicoi complex, 10 to 25 percent slopes, very stony
DuF	Ditney-Unicoi complex, 25 to 80 percent slopes, very stony
DxF	Ditney-Unicoi-Rock outcrop complex, 60 to 95 percent slopes
EcD	Edneyville-Chestnut complex, 10 to 25 percent slopes, stony
EcF	Edneyville-Chestnut complex, 25 to 80 percent slopes, stony
EsB	Elsinboro loam, 1 to 4 percent slopes, rarely flooded
EvD	Evard loam, 10 to 25 percent slopes
EwE	Evard-Cowee complex, 25 to 60 percent slopes
GrD	Greenlee very cobbly loam, 6 to 25 percent slopes, very bouldery
HaC	Hayesville loam, 6 to 15 percent slopes
HcC2	Hayesville clay loam, 6 to 15 percent slopes, eroded
HeD	Hayesville-Evard complex, 15 to 25 percent slopes
HrD	Hayesville-Evard-Urban land complex, 15 to 25 percent slopes
HuC	Hayesville-Urban land complex, 6 to 15 percent slopes
IoA	Iotla sandy loam, 0 to 2 percent slopes, occasionally flooded
JbD	Junaluska-Brasstown complex, 6 to 25 percent slopes
JbE	Junaluska-Brasstown complex, 25 to 60 percent slopes
LnC	Lonon-Northcove complex, 6 to 15 percent slopes
MaD	Maymead fine sandy loam, 10 to 25 percent slopes, stony
MgD	Maymead-Greenlee-Potomac complex, 3 to 25 percent slopes
NoE	Northcove very cobbly sandy loam, 10 to 45 percent slopes, very stony
PoD	Porters loam, 6 to 25 percent slopes, stony
PoF	Porters loam, 25 to 80 percent slopes, stony
PtB	Potomac cobbly loamy sand, 1 to 5 percent slopes, frequently flooded
PxA	Potomac-Iotla complex, 0 to 3 percent slopes, mounded, frequently flooded
RaD	Rabun loam, 6 to 25 percent slopes
RaE	Rabun loam, 25 to 50 percent slopes
RoA	Rosman loam, 0 to 3 percent slopes, occasionally flooded
SoD	Soco-Ditney complex, 6 to 25 percent slopes, stony
SoF	Soco-Ditney complex, 25 to 80 percent slopes, stony
TaC	Tate loam, 6 to 15 percent slopes
TaD	Tate loam, 15 to 25 percent slopes
Uf	Udifluvents, sandy, frequently flooded
Uo	Udorthents, loamy
Ur	Urban land

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

- National, state, or province
- County or parish
- Minor civil division
- Reservation (national forest or park, state forest or park, and large airport)
- Land grant
- Limit of soil survey (label)
- Field sheet matchline and neatline

AD HOC BOUNDARY (label)

- Small airport, airfield, park, oilfield, cemetery, or flood pool

STATE COORDINATE TICK
1 890 000 FEET

LAND DIVISION CORNER
(sections and land grants)

ROADS

- Divided (median shown if scale permits)
- Other roads
- Trail

ROAD EMBLEM & DESIGNATIONS

- Interstate — 66
- Federal — 287
- State — 52
- Secondary — 1215

RAILROAD name only

POWER TRANSMISSION LINE
(normally not shown)

PIPE LINE (normally not shown)

FENCE (normally not shown)

LEVEES

- Without road
- With road
- With railroad

DAMS

- Large (to scale)
- Medium or Small (Named where applicable) — water

PITS

- Gravel pit
- Mine or quarry

MISCELLANEOUS CULTURAL FEATURES

- Farmstead, house (omit in urban area) (occupied)
- Church
- School
- Indian mound (label) — Indian Mound
- Located object (label) — Tower
- Tank (label) — Gas
- Wells, oil or gas
- Windmill
- Kitchen midden

WATER FEATURES

DRAINAGE

- Perennial, double line
- Perennial, single line
- Intermittent
- Drainage end
- Canals or ditches
  - Double-line (label) — CANAL
  - Drainage and/or irrigation

LAKES, PONDS AND RESERVOIRS

- Perennial — water
- Intermittent

MISCELLANEOUS WATER FEATURES

- Marsh or swamp
- Spring
- Well, artesian
- Well, irrigation
- Wet spot

SPECIAL SYMBOLS FOR SOIL SURVEY

SOIL DELINEATIONS AND SYMBOLS — RaD RaE

ESCARPMENTS

- Bedrock (points down slope)
- Other than bedrock (points down slope)

SHORT STEEP SLOPE

GULLY

DEPRESSION OR SINK

SOIL SAMPLE (normally not shown)

MISCELLANEOUS

- Blowout
- Clay spot
- Gravelly spot
- Gumbo, slick or scabby spot (sodic)
- Dumps and other similar non soil areas
- Prominent hill or peak
- Rock outcrop (includes sandstone and shale)
- Saline spot
- Sandy spot
- Severely eroded spot
- Slide or slip (tips point upslope)
- Stony spot, very stony spot

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

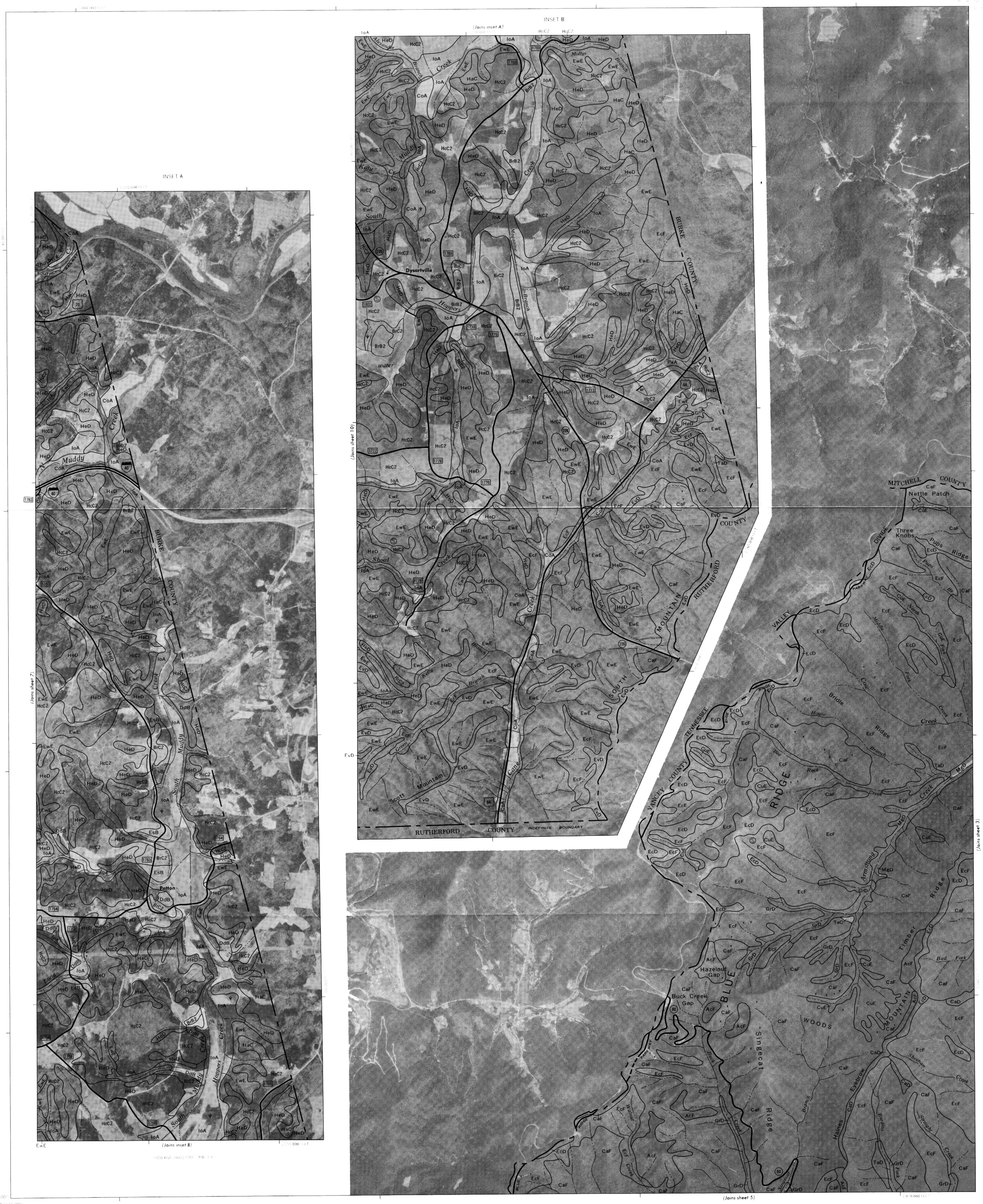
5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

N

McDOWELL COUNTY, NORTH CAROLINA NO. 1



5000 4000 3000 2000 1000 0 5000 10000 Feet
1 .5 0 1 2 3 Kilometers
Scale - 1:24000

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5000 4000 3000 2000 1000 0 5000 10000 Feet
1 .5 0 1 2 3 Kilometers
Scale - 1:24 000

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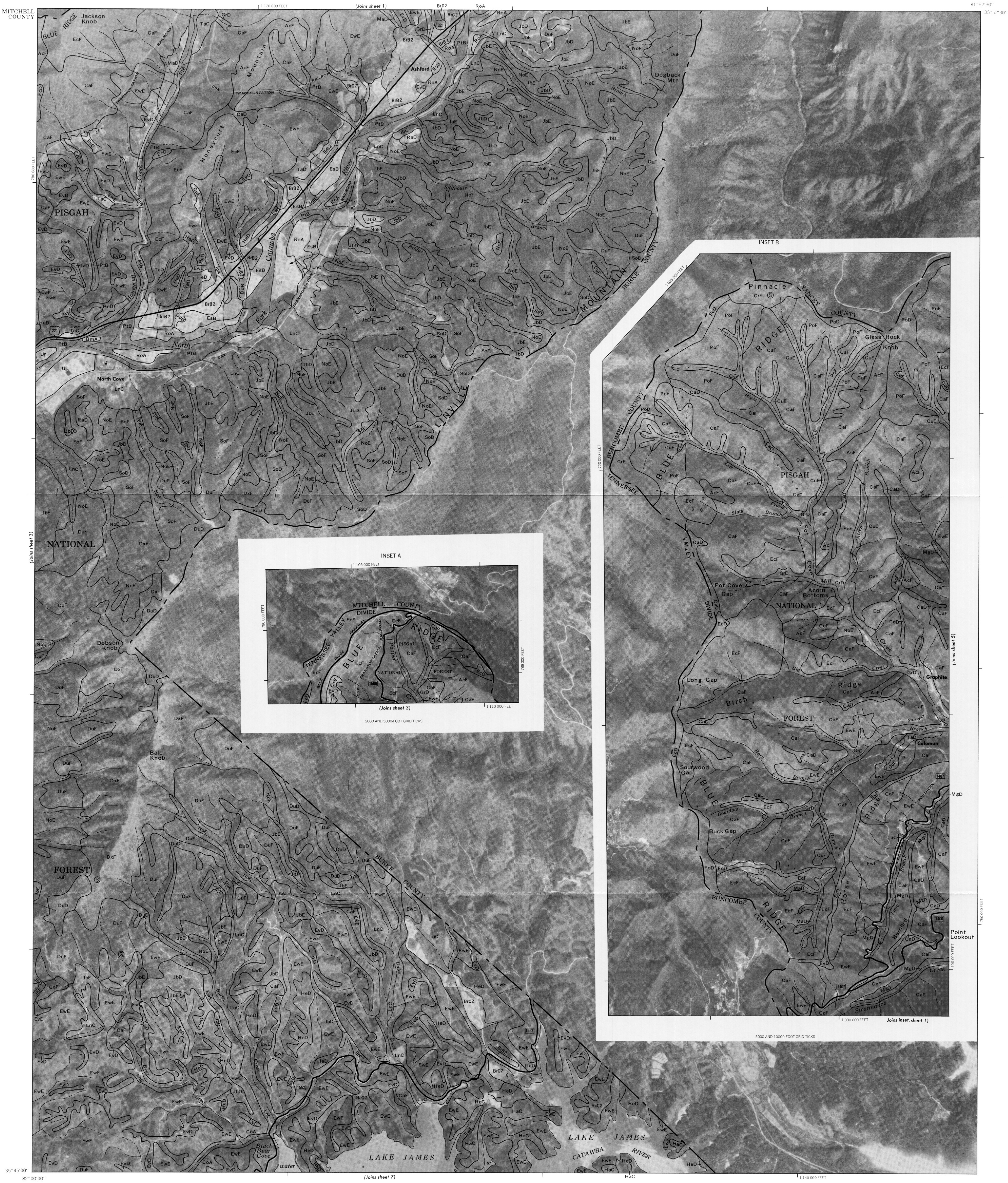
McDOWELL COUNTY, NORTH CAROLINA NO. 3



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5000 4000 3000 2000 1000 0 5000 10000 Feet
1 .5 0 1 2 3 Kilometers
Scale - 1:24000

N

5000 4000 3000 2000 1000 0 5000 10000 Feet
1 .5 0 1 2 3 Kilometers
Scale - 1:24000

McDOWELL COUNTY, NORTH CAROLINA NO. 5

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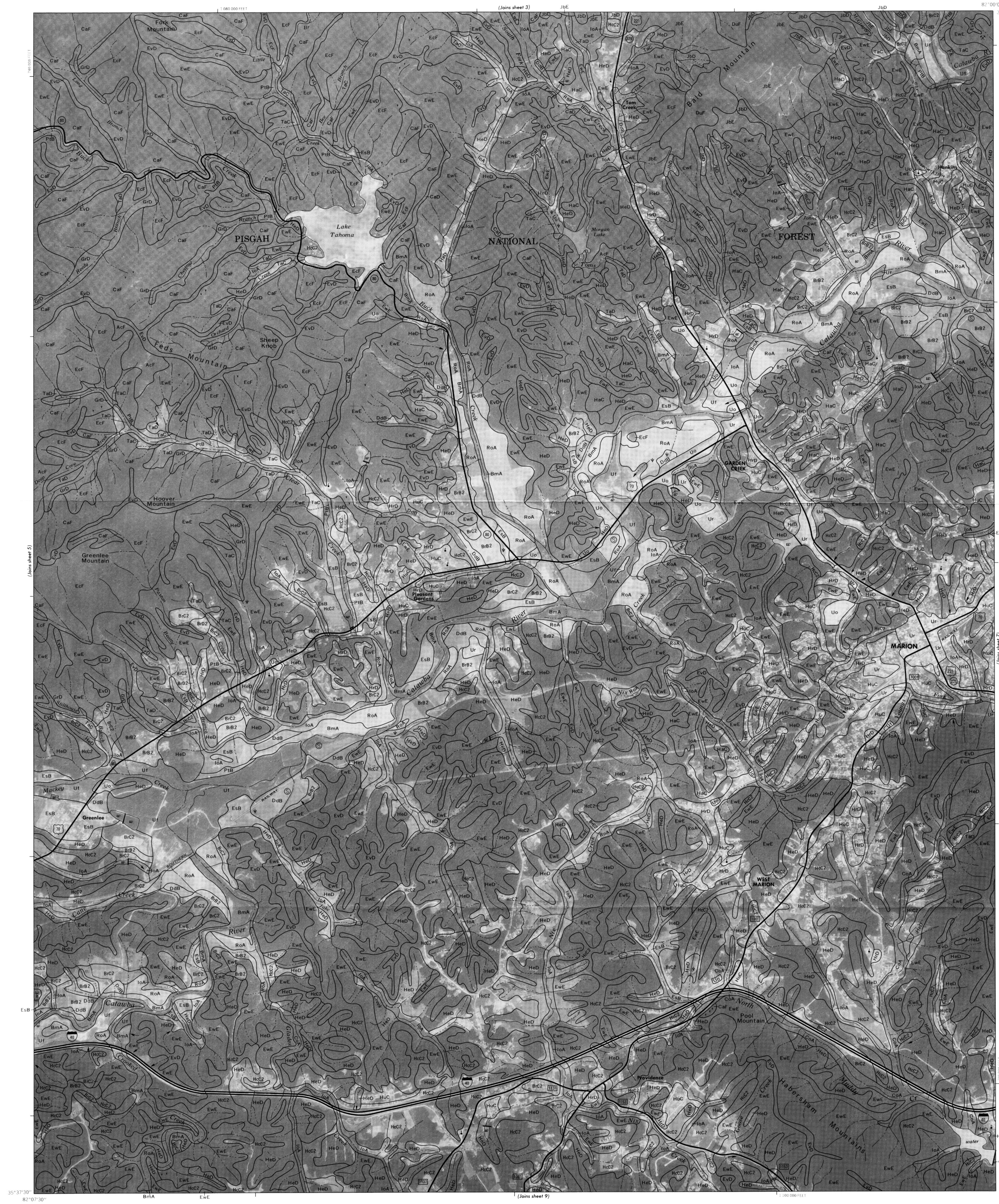

5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

N

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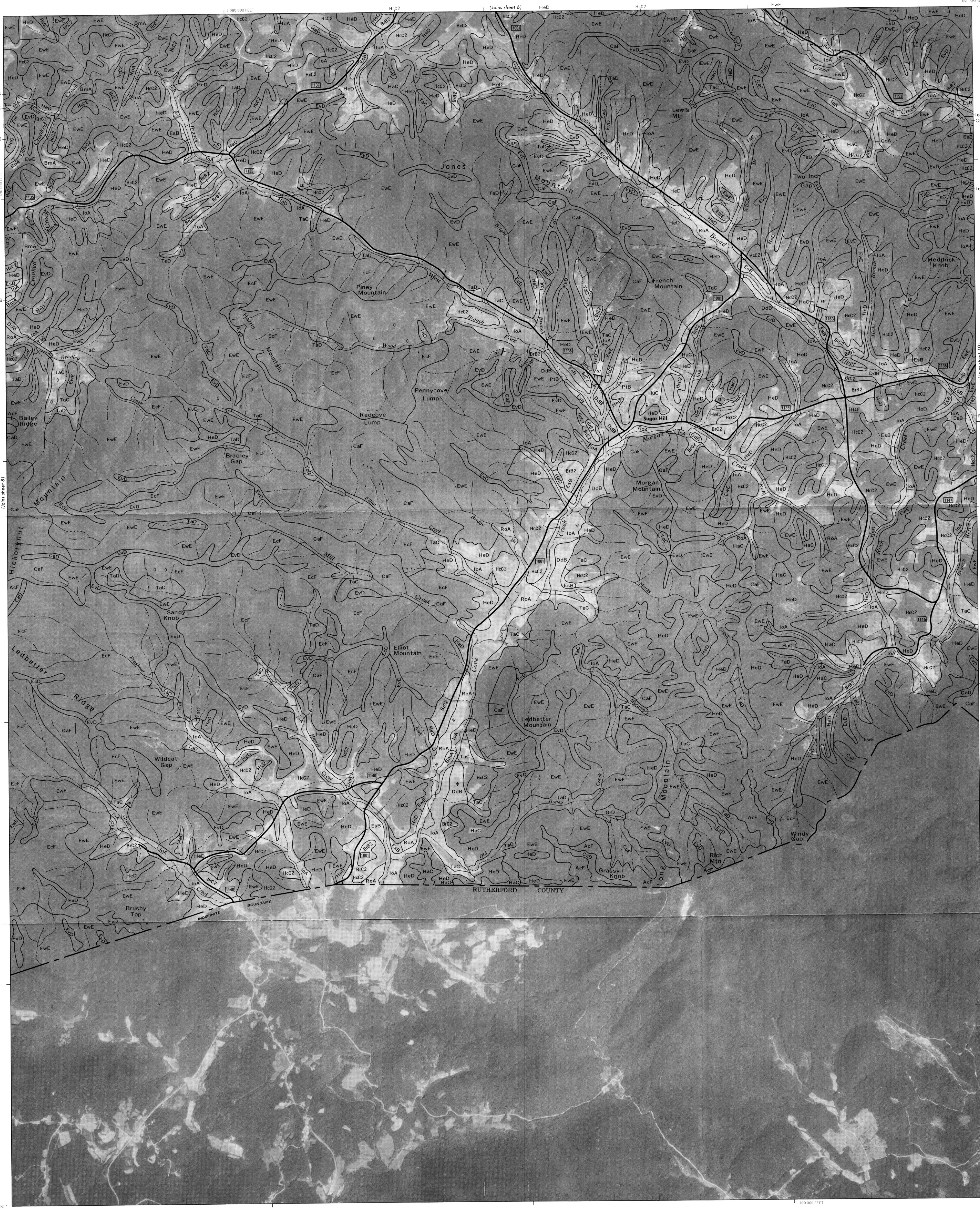
5000 4000 3000 2000 1000 0 5000 10000 Feet
1 .5 0 1 2 3 Kilometers
Scale - 1:24000

N

McDOWELL COUNTY, NORTH CAROLINA NO. 7

5000 4000 3000 2000 1000 0 5000 10000 Feet
1 .5 0 1 2 3 Kilometers
Scale 1:24000

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



5 000 4 000 3 000 2 000 1 000 0 5 000 10 000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24 000

N

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5000 4000 3000 2000 1000 0 5000 10000 Feet
1 .5 0 1 2 3 Kilometers
Scale - 1:24 000

N

McDOWELL COUNTY, NORTH CAROLINA NO. 10